FAY TRAVERS
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PMI

VOL. 3 NO. 1
JANUARY
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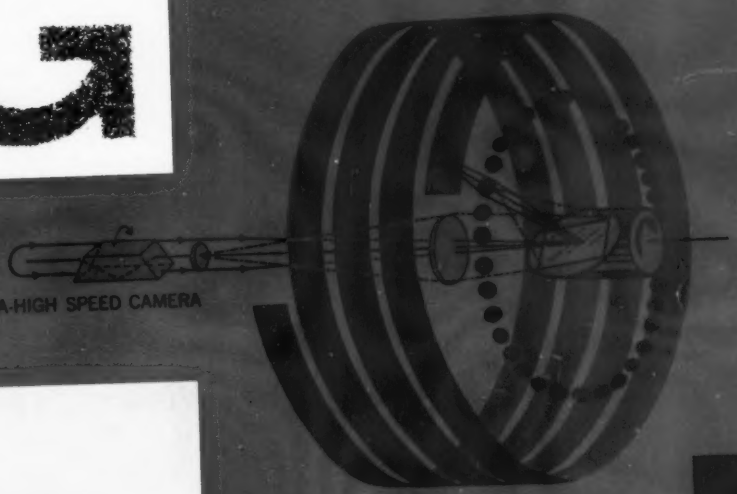
PRICE 50c

PHOTO METHODS FOR INDUSTRY

G

GRAIN

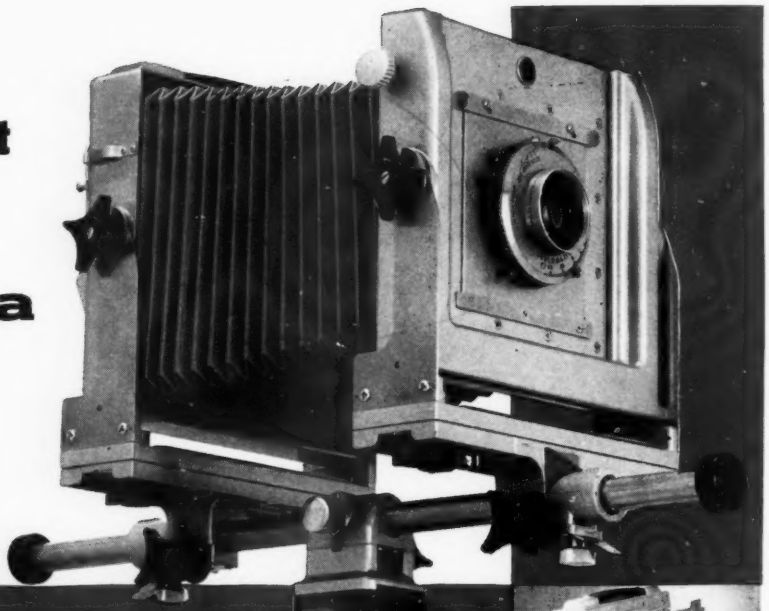


RUSSIAN ULTRA-HIGH SPEED CAMERA

PORTFOLIO NO. 19

PHOTO DEPARTMENT ANALYSIS

only the calumet 4x5 view camera offers the vital



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The spring back-release, the rotating back are just two of the many features that make the Calumet 4 x 5 view camera your best working partner for all assignments. The swings, the slides, the controls, the rigidity of the all-metal frame . . . these help, too, in getting top photographic quality. Here's a sturdy, versatile camera that's lightweight, easy to carry, easy to handle . . . always competent, always dependable. Try it and see.

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4x5 view camera
price $240

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camera division 6550 N. CLARK STREET, CHICAGO 26, ILLINOIS

Get more information. Circle 418, page 77

if you were designing the perfect 35mm reflex... how many of these requirements would you include?

CONSTRUCTION A flawlessly built camera body, mechanically precise, meticulously finished – rugged and dependable under the severest conditions of climate and usage.

EYELEVEL FINDER Optically precise – screen area exactly matching usable film area – image bright and distinct, easy to view in its entirety even with glasses – interchangeable screens permitting use of other types, as preferred, or for special work and interchangeable finders for switching to waist-level viewing.

MIRROR Instant return – to eliminate image black-out – fully automatic – requiring no setting or adjustment of the camera – the action fast, smooth, virtually imperceptible – the mirror always returning to precise focus position even with camera held upside down.

LENSES Finest optical quality – in a wide variety of focal lengths – readily and quickly interchangeable – all providing flawless definition, high resolution even at full aperture.

LENS DIAPHRAGM Internally coupled – requiring no previous setting or adjustment of the camera – fully automatic – closing down for the exposure and reopening instantly to full aperture so that there is no dimming of the finder image.

FOCAL PLANE SHUTTER Accurate at all temperatures – covering a wide range of speeds, each synchronized for appropriate flash bulbs and speedlight – provision for delayed action.

ACCESSORIES Truly versatile accessories: a compact, battery-operated motor for shooting pictures in rapid succession, hand-held or remotely – an exposure meter that can be attached and coupled to both the shutter and the lens diaphragm – equipment for close-ups, copying, macro work and photomicrography – flash units, high quality filters, hoods and other essentials.

HANDLING EASE Above all, an instrument that is responsive, easy and fast to use – all controls conveniently located – requiring a minimum of effort and a minimum of manipulation.

The new Nikon F automatic reflex may or may not be the *perfect* camera. We are not even sure whether the perfect camera actually exists. But, of this we are certain – *the Nikon F is the closest approach to perfection ever achieved in a 35mm reflex.*

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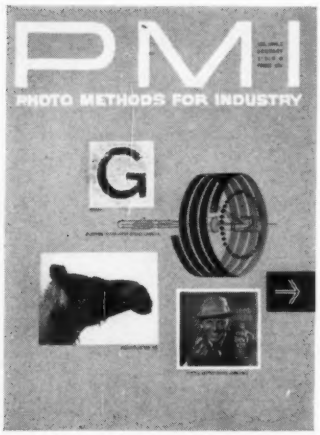
Nikon F with 50mm Auto-Nikkor f2 lens, $329.50 – at your Nikon dealer. For further details write to Dept. PM-1
NIKON INC., 111 Fifth Avenue, New York 3, New York
In Canada: Anglophoto Ltd., Montreal, P. Q.

Get more information. Circle 462, page 77

JANUARY, 1960

VOL. 3 NO. 1



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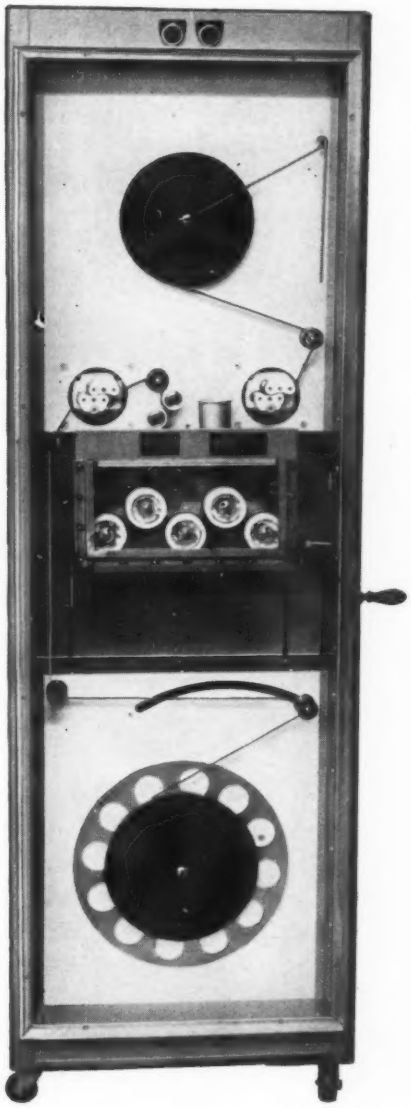

* RAPIDLY
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All you have to do is put the film in place and fill the solvent tank. The new Unicorn cleaner does the rest automatically—and speedily with all scrubbing action taking place below the solvent level. It effectively cleans motion picture films (negative and positive) and magnetic tape at rates to 300 feet per minute with complete safety. Cleaning is accomplished by counter-rotating velvet covered scrubbing rollers, effectively removing dirt, lint, oil, fingerprints and wax.

The Model A-5100 is a combination 16/35 mm film cleaner. Other cleaners are available for 16 mm film only, 35 mm film only and for 70 mm film only. All models include these special features:

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FLUID CUSHION PROTECTS FILM. *The fluid solvent forms a barrier between the scrubbing roller and film to prevent scratches and abrasions. Only velvet fibres lightly touch the film.*

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F.Y.I.

Grain is where you find it, usually on your best negatives which must be enlarged to 16 x 20. But like the cop when you need one, it is not as easy to find as it seems. For the article on grain *(page 46)*, the art director decided that nothing looks more like grain than grain. Ramon Rustia, our managing editor who has seen plenty of grain in his time, volunteered by appointment to produce one each grainy negative.

The set-up was simple, involving nothing more than photographing the letters on grainy film, souping in grainy developer and printing on glossy paper. All we had to do then was count the grains.

Somehow it did not work that way. No matter how Ray tried, the grain at the required 22X blow-up just didn't look grainy enough. It took three rolls of 35mm Tri-X before a grainy negative with real oomphy grain was secured. The negative was Tri-X, underexposed about three times, developed four minutes in straight Dektol at 75° F. The engraver made a line cut which emphasized the grain.

Don't get us wrong; we are as much anti-grain as any other red-blooded, American-type photographer. But if you *want* grain, there should be an easier way to get it. This progress business . . .

Photogrammetry is one of those scientific offshots of photography concerned with aerial photographs and their interpretation. A trained, experienced photo interpreter can spot a wad of chewing gum in an aerial shot and tell what flavor it is.

These people have their own society, the American Society of Photogrammetry, 1515 Massachusetts Avenue, NW, Washington 5, D. C. The Society has just published a new book, *A Manual of Photographic Interpretation.* In over 800 pages, secrets of this art are laid bare. Delivery will be in early spring. Price is $10.50 for members, $12 for non-members. For details, check with the Society.

The Houston, Texas section of the Instrument Society of America will be host to the first of three Instrument-Automation Conferences scheduled for 1960 by ISA. Theme of the exhibit will be "Process Control in the Electronic Era." The conference sessions, Feb. 1-4 at the Rice Hotel, will hear over 60 papers. The exhibit, Feb. 2-4 at the Sam Houston Coliseum, will have 25,000 sq. ft. of the latest and greatest in instrumentation . . . computers, data processing and information display equipment, transmission and telemetering instruments, etc.

Intelligence from overseas

Our German operatives, after a fleeting, furtive visit to a rathskeller frequented by industrial types report the following items being discussed over knockwurst und bier which they ordered only to remain inconspicuous.

Guests at the Berlin-Hilton can choose the decor of their suites at registration. Colored slides show the color scheme and decor of available space. The clerk shows the slide, the guest makes the choice.

Also bandied about is the way Prof. Erich Pietsch is using a Contax and reverse aerial photogrammetry to record the ice-age drawings in the caves at Altamira, Spain. The Frankfurt/Main savant will reconstruct these for an exhibit at Munich's "Deutsches Museum," a technical and natural science museum.

Having finished their snack, our operatives found it was time for dinner. Ordering egg foo yung to go, they left. More next month.

Last-Minute-Reminder-Dept.

The Adox contest for industrial cameramen closes January 31. Get busy and mail entries to Adox Industrial Awards, 951 Brook Avenue, N.Y. 51, N.Y. First prize is a complete Minolta SR-2 outfit including telephoto lens. The 7th Annual National Presentation Association competition for the "Best of Visuals of 1959" closes February 15. Open to all sponsors and producers of visuals, the contest will cover three categories: motion pictures, slide films, graphics. For complete details, write National Visual Presentation Association, 19 West 44th St., New York, N.Y.—THE END

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the most talked-about camera in years

HEILAND PENTAX H-2

No wonder photographers are talking about the Pentax! It's the lightest, trimmest camera in the entire single lens reflex field. And it's simplicity itself to operate, with no unnecessary, complicated gadgets—just precision controls that help you get the best pictures you've ever taken—

the brightest of all pentaprism viewfinders makes it easy to keep the life-size image constantly in focus. You look through the lens—get exactly what you see!

- the instant return mirror gives uninterrupted, follow-through viewing.
- the automatic diaphragm operates only when you want it to.
- the single, non-rotating speed dial has speeds from 1 sec. to 1/500 sec., plus Time and Bulb.
- the razor-sharp, 6-element 55mm f/2.0 Auto-Takumar lens is the fastest available for the price.
- With this lens, the Heiland-Pentax H-2 is only $179.50.

There's a complete line of Pentax accessories and interchangeable lenses, too—from macro attachments for extreme close-up work to a 1000mm lens that will bring out the smallest features of subjects half a mile away.

See the Pentax demonstrated now at your photo dealer, or write for free folder, describing the Pentax and the complete line of eleven lenses, and accessories.

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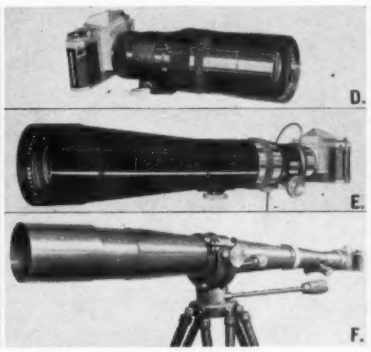
E. 500mm Takumar, f/5.0 $350.00 • **F.** 1000mm Takumar f/8.0 $1195.00 • **G.** Shown on Pentax-Bellows Unit $29.50, Right-Angle Finder $29.50



Get more information. Circle 436, page 77

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MONITORIZED RELAY TRANSISTOR CIRCUITS: with automatic cut-off switch, provide absolutely consistent light output at all times! Eliminate light or dark pictures because of light variation!

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Get more information. Circle 402, page 77

LETTERS

To the Editor:

I was jolted at seeing in your last issue [September, 1959] that your editor for photographic instrumentation said that in Los Angles S.P.I.E. stated rotating prism cameras had reached their limit. Apparently, your photographic instrumentation editor went out for a coffee break when things were beginning to get warm.

. . . Your correspondent failed to note the rebuttal that I made in which it was stated that the rotating prism could equal or surpass the intermittent cameras with design objectives and performance now that the film manufacturers have recognized that there is such a thing as high-speed photography and that they are producing film which is of very high speed and can allow the maximum aperture of the lenses to be reduced considerably to overcome the sagittal and tangential coma. . . . whoever edited the data on rotating prism cameras in an earlier issue neglected to call up John Waddell as to what he had along the line of high-speed cameras.

John H. Waddell

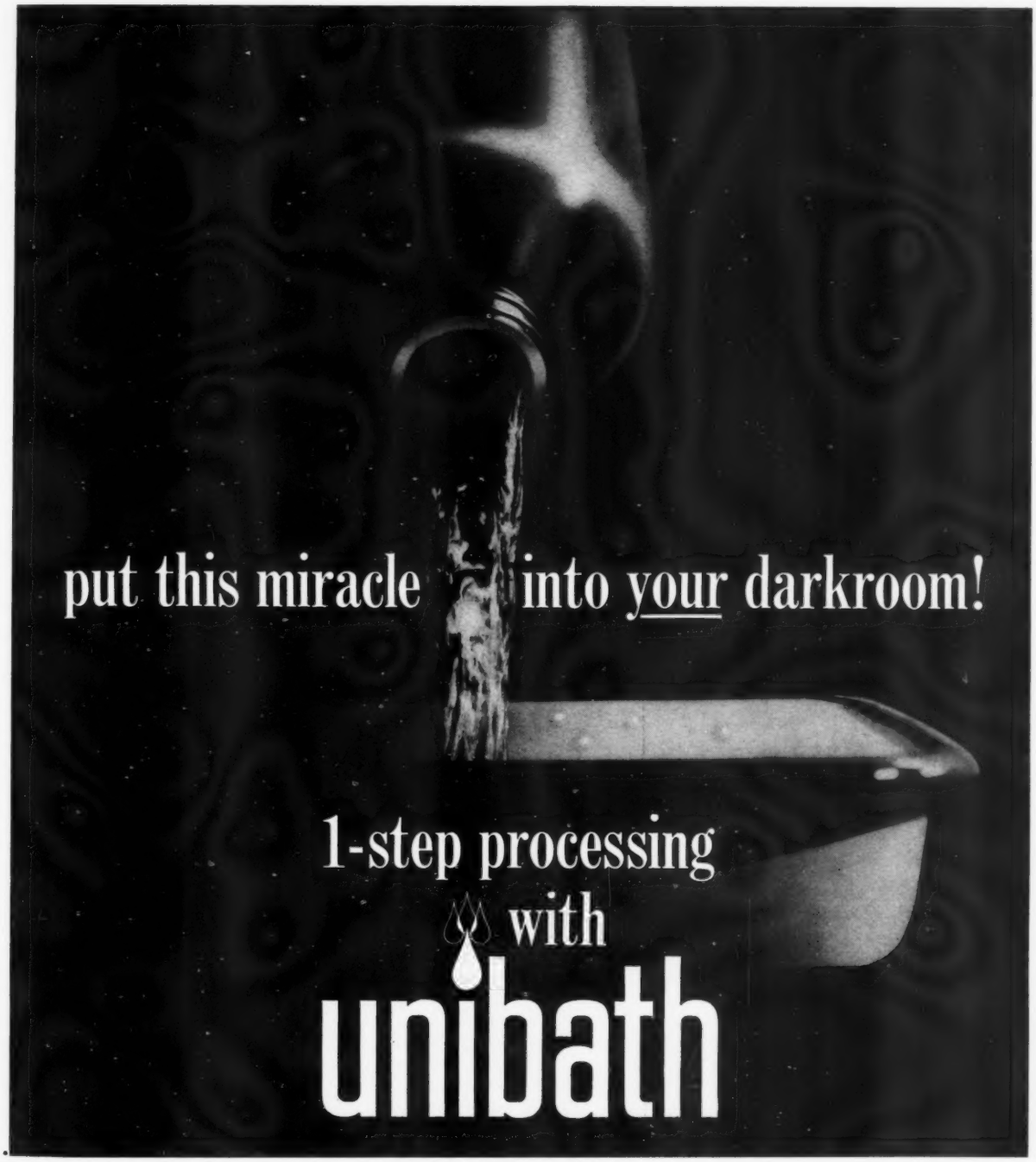
See "New Products" page 80.—Ed.

To the Editor:

We note with interest your listings under Dimensional Stability in the November issue of PMI. As one of a number of DuPont "Cronaflex" dealers, we question the propriety of listing only the Bruning Company as such a dealer without giving their competitors comparable listing.

Several errors also appear in the Bruning listing. For instance, all "Cronaflex" is matte and translucent —there is no transparent "Cronaflex." The price you quote is accurate for the square inch, but somewhat deceptive when listed with an "ft." after it in a field where the square foot is a standard. Your comment at the bottom of the chart on Cronar and Mylar is incorrect. "Cronar" is produced under close supervision as a film base for any type of silver emulsion by DuPont's Photo Products Dept. "Mylar" is a product of DuPont's Film Dept., and it is not specifically designed as an emulsion support . . .

A. A. Krieg, President
Industrial Photo Products Inc.
New York, N. Y.



The experts have spoken! Newspapers, magazines, police departments, business and industry have exhaustively tested UNIBATH in their darkrooms and the verdict is in. It works! **It's great! We want it!** . . . No wonder! 6-minute, 1-step film processing. 5-minute washing. No bleaching or staining. Archival negative quality. Excellent grain structure. No critical time or temperature controls. No overdevelopment. (UNIBATH develops all images to the full extent of the exposure then stops—automatically.) Cost, processing capacity and storage life equal to conventional 3-step processing. UNIBATH is available at your dealer. CC-1 for normal films normally exposed . . . CC-2 for forced development and available light photography . . . CC-3 for contact and projection papers.

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Get more information. Circle 423, page 77

REPRODUCTION TRENDS

Sharp cloth intermediate prints can now be made with present diazo process equipment by using Post 208TC (black) or 209TC (sepia) cloths.

Now widely accepted . . . a diazo cloth with denser black image

One of the big stumbling blocks to more widespread use of intermediate papers and cloths has been the lack of a good, sharp, dense *black* for ammonia process equipment.

When Post laboratories licked the problem in intermediate *papers* with the introduction of an improved Vapo Black, it opened up new challenges. There was a need to develop similar superior image densities on more permanent base materials. Among these newer Post products which are now widely accepted are 208TC (black) and 209TC (sepia), two Vapo Intermediate Cloths with outstanding characteristics. Here are cloth reproductions with truly dense images that have proven remarkably permanent after extensive tests.

Using 208TC or 209TC Vapo Cloth, you can produce highest quality cloth intermediates with your present diazo process equipment. It is a convenient, low cost, single-operation method requiring no negatives.

Tough intermediates save originals

The durable, premium quality white tracing cloth base stock holds up well even after prolonged filing. In accelerated aging tests, Post 208TC and 209TC prints were held at 100° C for 20 hours. At the end of that time there was no evidence of bleeding . . . while transparency loss was minor.

Interestingly enough, printing speed (making the intermediate) of both products is unusually high. Even more important, there is no sacrifice of image density to obtain this high speed. Prints are still strong, clean and dense. Similarly, printback speed is fast with crisp prints the result every time.

Prints better than originals

In many instances, the "contrasty" emulsion makes it possible to increase the intensity of an original drawing and actually make the intermediate better than the original. But in any case, a print on 208TC or 209TC has the sharpness, contrast and density that are the marks of quality reproductions.

For detailed information on 208TC and 209TC write Frederick Post Company, 3660 North Avondale Avenue, Chicago 18, Illinois.

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Get more information. Circle 471, page 77.

COMING UP

JANUARY 18-19 New England Industrial Photo Trade Show. Motel 128, Dedham, Mass.

FEBRUARY 1-4 Instrument-Automation Conference sponsored by the Instrument Society of America, Houston Coliseum, Houston, Texas.

MONTHLY MEETINGS

FIRST MONDAY • Rochester Chapter of SPSE. Contact Woodlief Thomas, Jr. Color Technology Division, Building 65, Kodak Park, Rochester 4, N. Y. CO 6-2500, Ext. 3784.

FOURTH MONDAY • Rocky Mountain Industrial Photographers. Contact P. H. Broadie, 2170 S. Lincoln, Denver 10, Colo. Telephone PEarl 3-2200.

LAST MONDAY • Southern California SPSE. Contact Ben Augustine, 235 Annandale Rd., Pasadena, 2, Calif. Telephone MU 1-0076.

THIRD TUESDAY • Binghamton Chapter of SPSE. Contact H. G. Morse, Ansco, Binghamton, N. Y. RA 2-4221, Ext. 573. • Industrial Photographers of Southern California. Contact Janet Marshall, Executive Secretary, 5463 Virginia Ave., Los Angeles 29, Calif. HO 5-6614.

SECOND WEDNESDAY • Photographers in Industry, Pittsburgh 10, Pa. Contact Cal Murberger Jr., Blaw-Knox Co., Aetna-Standard Division. GR 1-6920.

SECOND & FOURTH THURSDAY • Industrial Photographers Association. Contact Tom Holbarton, 181 Lake Drive West, Packanack Lake, Wayne, N. J. OX 4-2058. Or R. Handley, The Port of New York Authority, 111 8th Ave., New York 11, N. Y. AL 5-1000, Ext. 605. • (Second Thursday) National Visual Presentation Association, Inc. Contact M. E. Schack, 19 West 44th Street, New York.

If you wish to have your organization's meetings listed in future issues send the necessary information addressed to **COMING UP, PMI,** *33 West 60th St., N. Y. 23, N. Y.*

New Kodak Ektalith Loader-Processor, teamed up with office-type camera, brings the speed, quality and flexibility of camera copying to "paper platemaking"

Now...make offset paper masters photographically *in full roomlight!*

Imagine producing 10 high-quality offset masters—reduced, enlarged or same size—in 10 minutes. And doing the entire job next to your duplicator.

Kodak's Ektalith Loader-Processor brings this *unmatched* convenience to your office—gives you all the savings of *revolutionary* Ektalith method.

This ingenious unit, which serves as a "desk-top darkroom," is used to load high-speed Ektalith Transfer Paper for exposure to camera . . . and to process the exposed sheet. Attached Ektalith Transfer Unit puts the image on a paper master which gives you hundreds of sharp duplicator copies of line work and a variety of halftones.

Costs are surprisingly low. New Ektalith Loader-Processor with Transfer Unit costs less than $600. Uses inexpensive paper masters and materials. *And anyone can do the job!*

Free booklet explains Ektalith Method in detail—how it's also used to produce 10 or more direct copies without "platemaking"; as well as enlargements from microfilm. *Phone your local Kodak Ektalith dealer or write* Eastman Kodak Company, Graphic Reproduction Division, Rochester 4, N. Y.

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Get more information. Circle 468, page 77

by Lloyd E. Varden

PHOTO METHODS FOR TOMORROW

New b&w film standard to double e.i., ease exposure calculation

The long awaited revision of the American Standard Method for Determining Photographic Speed and Exposure Index (PH2.5–1954) was announced on Friday, Dec. 11, 1959 at a special press conference held in New York City. (Unfortunately I was in California at the time so much of what follows is based upon notes of others present. At press time ASA has released no printed data.)

Mr. John L. Tupper, Chairman of ASA Subcommittee PH2-18 on Black-and-White Speed and Exposure Index, stated that work on the revision had begun in 1957, but that so many problems were involved the final proposals of the subcommittee could not be submitted to ASA Sectional Committee on Photographic Sensitometry, PH2, until Thursday, Dec. 10. This committee promptly approved the recommendations of the sub-committee. The next step will be the publication of the proposed standard to obtain the reactions of photographers and others concerned before it is accepted officially by the ASA Photographic Standards Board. Final approval though is almost certain.

Major aims of revision

In revising PH2.5–1954 (originally published as ASA Standard Z38.2.1–1947) the subcommittee had three major aims. First, they wanted the safety factor incorporated in the method for measuring film speed to comply more realistically with present-day practices and black-and-white film properties. Second, they sought sensitometric provisions that correlated better with practical conditions. Third, they desired sensitometric criteria that would be amenable to international standardization and a method of designating film speed which eventually could lead to "an additive or simplified exposure value system." (See Table III, page 71.)

New safety factor

Without question, the safety factor of 2.5 times applied in the earlier standard for determining exposure index was the cause for most criticism of E.I. values by professional photographers. The subcommittee recognized the fact that film speed evaluation must keep pace with changes in practice. Therefore, in revising the standard the safety factor was reduced to 1.2 times. In effect this amounts to elimination of a safety factor. However, Mr. Tupper pointed out that when the 2.5X safety factor was adopted twelve years ago the trend toward the use of small film sizes (35mm and 2¼ x 2¼ in.) had just begun. With these small formats overexposure is less readily tolerated if graininess is to be held to a minimum and detail rendering to a maximum.

New sensitometric specifications

The previous standard made use of a gradient method for specifying the exposure point from which the film speed was determined. This gradient, located in the toe region of the D-Log$_{10}$E curve, was defined as 3/10 the average gradient of the curve over a log exposure range of 1.5, starting from the fractional gradient point itself. Of course, the method of exposure and degree of development, etc., were also spelled out in the standard. The general idea behind this concept was that film speed should be measured from a point on the D-Log$_{10}$E curve where the density begins to increase with increasing exposure at a sufficient rate to assure tone separation in the shadow areas of prints. The specific fractional gradient adopted was derived from a statistical analysis of hundreds of prints made from negatives that had been exposed to

(*continued on page* 14)

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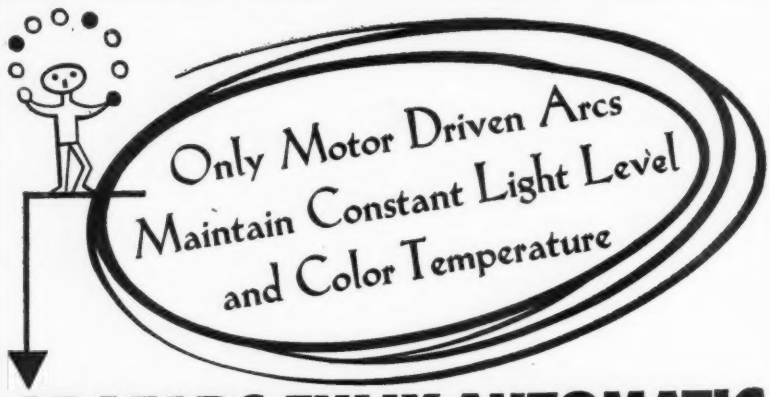

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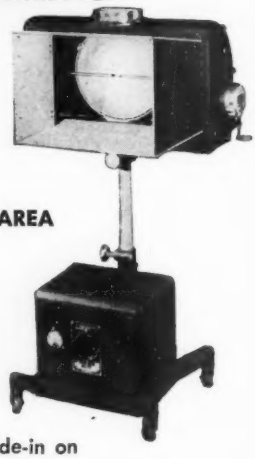

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METHODS FOR TOMORROW

(*continued from page* 12)

various subjects through a wide range of exposures. Print quality was found in this study to increase with increasing exposure up to a limiting value, beyond which the quality evaluations of observers remained constant. Thus it was possible to define in a practical way the minimum exposure required for a negative for it to yield an excellent print. The prints used in the statistical study were made by contact printing, and so negative graininess and other factors that influence quality in enlargements were not taken into consideration.

In European countries, with the exception of England, the ASA fractional gradient method was not looked upon with favor. The German DIN system, for example, specifies a fixed density (0.1 above the fog density) as the sensitometric criterion for measuring film speed. It so happens that the exposure point so defined is generally located rather near the exposure point determined by the fractional gradient method. By applying a small constant or by compromise agreement the two systems can be brought into line with each other. The ASA subcommittee, therefore, in the interest of international standardization, dropped the fractional gradient criterion and agreed to base the newly proposed standard on a fixed net density also, presumably a density of 0.1 above fog density or some compromising density value. The exact density was not recorded at the aforementioned press conference.

The light source for making the sensitometric test exposures has also been changed. Formerly the time-honored Davis-Gibson filter used in conjunction with a tungsten filament light source of 2360K color temperature, was recommended. This produced a light similar in spectral quality to mean noon sunlight in Washington, D.C., 5400K. The new standard proposal calls for adoption of a Taylor-Kerr liquid filter, plus additional correction to account for the spectral absorption characteristics of typical photographic lenses. The Taylor-Kerr filter used with an appropriate light source yields a higher color temperature than the Davis-Gibson filter and closely approximates the spectral quality of average sunlight and skylight combined.

The degree of development for the sensitometric test exposures has

(*continued on page* 35)

by David B. Eisendrath, Jr.

WORKING PHOTOGRAPHER

Some comments on static—Part I of a series on this photo pest

Of all gremlins that plague photographers, the most annoying, probably are those having to do with static electricity, for not only are they difficult to detect in operation, but it is often hard to identify them or their source; they are transient, intermittent and unpredictable; and often their damage and havoc is extremely expensive to photographers in time, material, and frustration. Inasmuch as static is especially annoying this time of year in the northern part of the country, and I have been engaged in tracking down static gremlins for several of my clients, it might be interesting and helpful to know something about the field.

Static Areas

Static electricity is probably familiar to everyone as the phenomenon that occurs when we glide across a heavy carpet and accidentally touch a metal object and a spark occurs, or you are probably also familiar with the trick of rubbing a hard rubber comb on a piece of silk or wool and watching it attract small pieces of dust, paper, fibres, hairs and so on. Amusing as these experiments are, static has seriously annoyed and handicapped photographers in many ways. There are in general four basic areas in which static has been a nuisance to industrial photographers:

A. With electronic equipment, where strobe untis self-trigger or flashbulbs accidentally go off.

B. With built up charges on equipment such as driers, trimmers, vacuum frame glasses, X-ray and halftone screens, negative carriers, or on data cards where static causes objects to stick together and become hard to handle.

C. With processed photographic material where negatives, transparencies, etc., attract dust and dirt.

D. With raw film, unexposed, or exposed but undeveloped where light (and sometimes heat) of static discharges cause images on the sensitive material which then develops up into an image which may spoil a picture.

Without going into an elaborate technical explanation we should take a brief look at the actual cause of static in order to understand a bit about it. All matter is made up of atoms which contain electrons and protons. The electrons are said to have a "negative" electrical charge and the protons a "positive" charge. Charges with the same sign repel each other while charges with opposite signs attract and then neutralize each other. In substances which are neutral, electrons and protons are present in equal numbers, but a body which has an excess of electrons is "negatively" charged, and a body with a deficiency of electrons (not enough to neutralize the protons in it) is "positively" charged. Electrons are able to move within a body with great mobility, and can also migrate to other bodies depending upon the nature of the materials involved. Such things as hard rubber, certain plastics, film base, glass, and other good insulators hold electrons for a long time and do not allow them to move freely about as they would in a conductor. So they can not only hold a charge, but allow a big accumulation to be built up before it is dissipated by moving to an adjacent surface, or jumping with a spark like a lightning bolt, or jumping in a series of smaller electrical discharges. At any rate, many materials used in the photographic field are subject to the kind of forces which tend to create static. A hard-rubber comb rubbed briskly with wool allows some of the surface electrons at the points of contact to flow from the wool and stick to the rubber. This leaves the wool with a positive charge. We don't regularly use hard-rubber combs for photographic purposes, yet we (or our equipment) may duplicate this ac-

(*continued on page 22*)

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WORKING PHOTOGRAPHER

(*continued from page* 21)

tion, as well as others which cause static problems.

Static as it affects photographers is caused generally by three kinds of things: FRICTION between surfaces (such as rapid movement of film across a tabletop); PRESSURE forcing surfaces together, especially dissimilar surfaces (this is why adhesive tape on a film-can may spark when pulled off quickly); TENSION or deformation of film surfaces (which may be related to strain problems).

Basically the techniques of reducing or eliminating static problems consist of eliminating movements that cause static (avoid moving film rapidly under static producing conditions), setting up means for static charges to run off or dissipate (such as grounding equipment if possible), treating equipment or film with static inhibiting solutions (which are mostly hygroscopic and allow charges to run off into the atmosphere) or getting ionized air in contact with the materials so that static can run off more quickly.

It is important to realize that there are many conditions under which static is more liable to occur and also that some people are exceptionally good (or bad) generators of static. Dry and/or cold air is usually thought of as being especially conducive to static; it is. But damp air often causes static problems, too. For example, if you'll look at the kinds of things that cause static, you'll see that pressure forcing surfaces together makes for a static condition. When rolls of film (motion picture stock, for example) are wound tightly on a roll, the dissimilar emulsion side and base side being together may create static, especially when rolls are wound very tightly and unwound very fast as in a high-speed camera or on a rewinder. Moist air or high humidity may cause a tighter adhesion of surface contact between a slightly soften emulsion and base side and cause what is known as "moisture static." Change of temperature from colder or warmer than the temperature at which the film was originally wound may cause contraction or expansion which creates friction if a section of film moves over another section, or it may also cause a tightly wound roll of film to expand or contract in what is known as a "clock-spring" action, which may also cause it. Ideally you should work when possible at room temperature and with a relative humidity of 55 per cent.

Industrial engineers have known for years that some people are particularly good creators of static. Many factors such as the capacity of the body, the dryness and texture of the skin, the way they move, the clothes they wear, can all be great causes of static. If a person is chronically bad, he may just have to be kept from working where his personal generation of static can have too serious an affect on photographic material and equipment, but some measures can be taken to help reduce personal static generation. Avoiding the wearing of wool, silk, or nylon may be a severe handicap, and changing the conductivity of the skin may be impossible, but there are some things you can do.

There are liquids sold in department stores designed to reduce static in women's wear and to keep slips or skirts from sticking to legs. Some detergents will also do this. I have used such products to reduce the static charge built up on nylon coveralls as well as wool sweaters, nylon underwear, and film handling gloves with good success. I have also used one ounce of Ecco 121 (Electro Chemical Products Corp., Montclair, N. J.) in a quart of water or a 5 per cent solution of Tamol N (Rohmand Haas Co., Philadelphia) in water as a final rinse for clothes. People who are great static generators may find this clothes treatment effective.

Hot Charlie's

I have also found some success in grounding static makers. (Industrial engineers call them "hot Charlie's" or "hot pappas or mammas.") A short chain around the ankle dragging on the floor is NOT a comfortable daily routine to go through (although surgeons sometimes do it), but I found that since rubber or crepe soled shoes are particularly offensive, I can ground them by poking an ice-pick through the sole (with foot out, of course) and then with a needle, inserting a piece of tinsel ribbon such as silver gift wrap ribbon through the sole, allowing an inch to stick out inside and outside at the point where the ball of the foot makes most contact. If it is painted with rubber cement at the point where it goes through the sole it will seal in tightly and act as a permanent ground. Be sure your silver ribbon is conductive; a piece one-quarter or one-half inch wide does fine. Sometimes you can go even further and see that a particularly "hot" worker stands or walks over a flat grounded piece of metal, and that he can touch a grounded metal surface frequently.—TO BE CONTINUED

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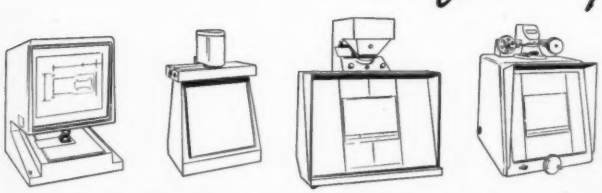

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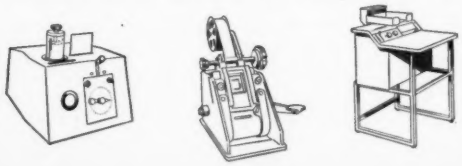

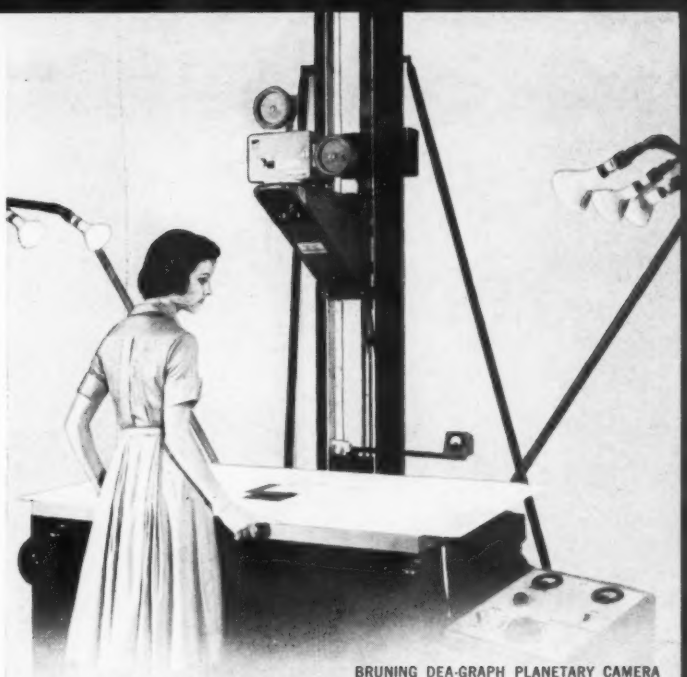

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HERBERT P. PASCHEL

REPRODUCTION & GRAPHIC ARTS

How to choose and use a lighting system for in-plant reproduction

Until recently the carbon arc was the dominant light source in the graphic arts. Even as late as the prewar years the available arcs were chiefly of the solenoid type and limited to about three brands. Selecting a new lighting outfit was comparatively easy in those days. Having decided on the manufacturer and type of lamp (camera or platemaking), the remaining consideration was intensity. This was resolved by the number of arcs employed (single arc, double arc, double-deckers, etc.), and the amperage. And that was it.

Thanks to technological progress, light sources currently in use are extremely varied. Among them are the following:

Incandescent Sources • Filament Lamps • Carbon Arcs • Tungsten Arc *(enclosed)* • Zirconium Concentrated Arc.

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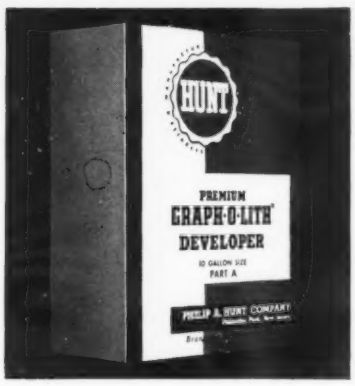
The graphic arts photographer of today can choose his light to fit his exposure needs precisely. In some cases he has no choice—the light source is an integral part of the equipment. But despite the many advantages progress in illumination engineering offers the photographer, the greater selection of light sources has created any number of new and often puzzling exposure problems. Let's review how some of the inherent differences in light sources affect exposure, processing and the result.

One obvious point of difference is the intensity of the light produced by the sources listed. On the surface it would seem that an intensity difference should not offer any problems. But as a matter of fact, working on even the simple assumption that exposures can be cut in half merely by doubling the intensity of the light (or vice versa), can lead to some startling surprises. The popular belief that equal exposures result when the product of light intensity and duration is constant has been proved to be false. Not only does effective emulsion speed vary at differing intensity levels but the characteristic curve varies also. Because of this it is not safe to assume that adjustments in exposure and developing time will fully compensate for the changes induced by light of different intensities.

Light sources range from the extremely diffuse fluorescent tubes to the sharply defined point sources such as the zirconium arc. This factor alone can have a pronounced influence on the result by virtue of the manner in which the light is reflected from, or transmitted through the copy. The difference in tone rendering between condenser and diffuser type enlargers is a prime example of this effect.

Spectral distribution is another aspect of light sources in which significant differences exist. Incandescent sources generally emit a continuous spectrum in which all wavelengths are present to some degree but vary in respect to the proportions of the various wavelengths. Gas discharge sources, on the other hand, vary in their spectral output according to the characteristics of the particular gas or gases employed, current density, pressure, etc. The light emission from such sources consists either of isolated spectral lines (discontinuous spectrum), or are a combination of continuous and discontinuous spectra. Low pressure mercury vapor lamps have several lines in the near ultra-violet, blue, green and yellow regions. Fluorescent lamps combine a continuous spectrum radiated by the phosphor with a "line" spectrum of the mercury vapor. Flashtubes

(continued on page 26)



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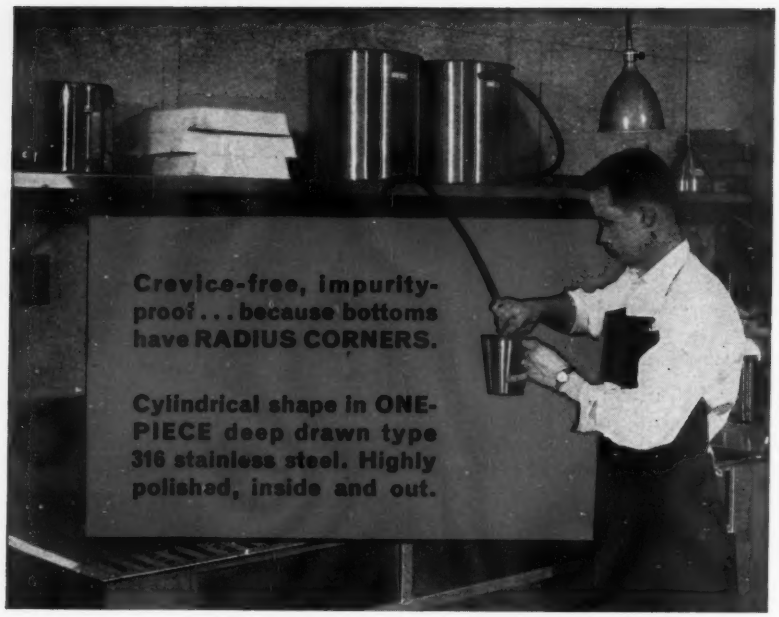
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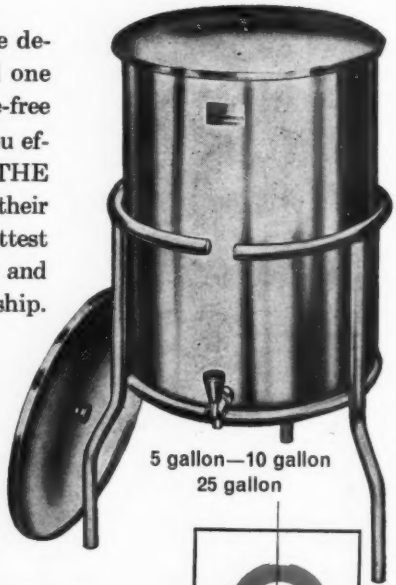

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GRAPHIC ARTS

(*continued from page* 24)

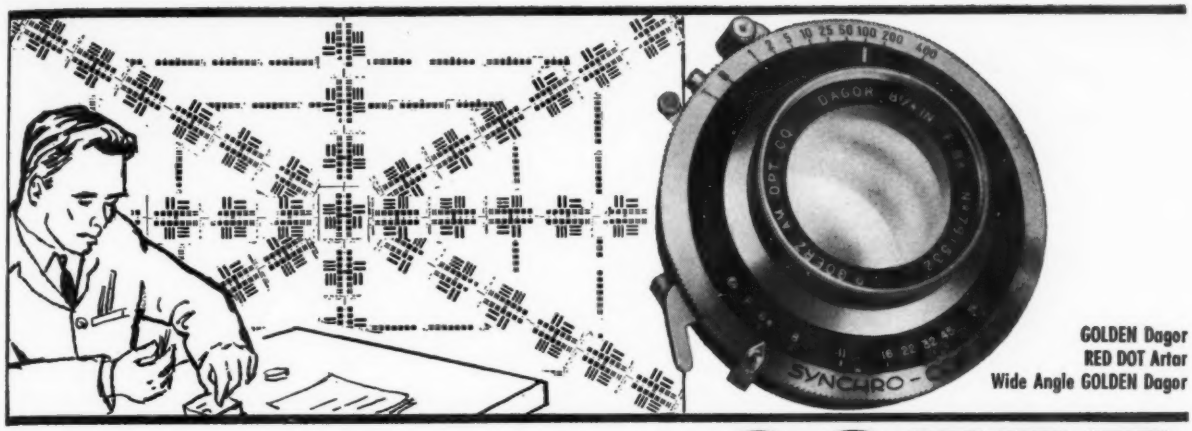
and other discharge lamps using the rare inert gas xenon emit light with less prominent spectral line (or none at all), and approach very closely the spectral distribution of mean noon daylight.

Photographic efficiency depends more on the spectral distribution of the exposing light than is generally realized. If all sources had an equal energy spectrum, then intensity alone could be used as a yardstick for determining exposure efficiency (discounting, for the moment, the reciprocity factor). Since such is not the case, we must consider both the spectral emission of the light and the color sensitivity of the emulsion in relation to the photographic result wanted. While a continuous spectrum light (white) is necessary when the work involves color separation and color rendering, for many strictly monochromatic applications white light is both unnecessary and wasteful. For most black-and-white line and halftone work with blue sensitive and orthochromatic emulsions, less than half of the usual white light is actually utilized in the exposure.

When color rendering is not a factor, maximum exposure speed is obtained when the peak spectral output of the light matches the peak sensitivity of the emulsion. For this reason many limited spectrum sources are worthy of serious consideration. A case in point is making halftone positives from continuous tone negatives. One photographer had a process camera with a built-in illuminator containing white fluorescent tubes. These were necessary for making color separations from transparencies but were wholly inadequate for the halftone exposures. Since the construction of the illuminator precluded adding more tubes, it seemed almost necessary to discard the fluorescent fixture and substitute carbon arcs. But the problem was solved simply by using green fluorescent tubes for the halftone exposures. Tests had indicated that the green tubes reduced exposure time to about the same extent as the carbon arcs that were being considered. The reason for their efficiency in this case was that the green tubes had an extremely high light output in the spectral region corresponding to the peak sensitivity of the emulsion.

Variations in the tone scale are another point closely related to the color of the exposing light. With

(*continued on page* 63)



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by Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

Some tools to lighten the burden of keeping your colors consistent

As color materials are improved, they seem to get more and more difficult to process to obtain and maintain color accuracy and consistency.

As a result, it is necessary to use special equipment to overcome the narrow tolerances of the film.

Automatic replenisher

One of these is the Rolor Automatic Replenisher System. According to the manufacturer, "the system delivers precise amounts of replenisher to any specific chemical tank, eliminating completely the time-consuming and time honored 'dip-out-measure-off-pour-in' technique.

"In processors so designed, multiple time-spaced processing runs may be made without the loss of quality caused by improper replenishment due to timing conflicts.

"The system consists of two basic elements; the master control unit and a rack which houses special modules containing the replenishment solution and the components of the control unit governing replenishment.

"The storage rack may be separated from the processing unit by as much as 100 ft. on the same floor level. This is achieved by employing low-level nitrogen pressurization for flow control. This also increases the life of the chemical solutions by reducing oxidation rates due to the presense of only nitrogen in the pressurized storage modules."

By keeping the replenisher tanks under constant pressure, the flow rate will not vary regardless of the volume in the storage tanks. The operator need only turn a dial to the number of sheets of film already processed and then push a button for each solution as needed.

The proper amount of replenisher is injected into the bottom of the tank and the excess will overflow through a hole at the proper level of the tank.

The unit incorporates low-level indicators for the individual replenishment modules. The safety low-level control allows for a selective check on each storage tank, both visually and audibly, by an illumination indicator and an alarm signal.

The processing unit is basically similar to other processing units where all the tanks of water are jacketed with complete temperature control, nitrogen gauges, regulators, affording maximum consistency.

Bernalen of Brooklyn makes a custom processing machine with automatic replenishment, but with individual pumps for feeding the solutions from the storage tanks. The unit is available with individual pumps and filters for continuous filtration of the solutions. All solutions are fed into each tank from the top and go to the bottom of the tank.

It too contains the overflow hole, but no other holes in the tanks, avoiding the possibility of contamination of processing solutions.

Both manufacturers will custom-build and add whatever refinements you can afford.

Color analyzer

One of the most efficient instruments for analyzing color negatives is the Macbeth Quanta Log Photographic Color Analyzer, Model EP-1000. Its light sensitivity is extremely high. It permits the operator to take direct tri-color readings from most negatives after the enlarger has been brought to the required magnification. In addition you can read through printing filters, which increases the degree of accuracy.

The Simmons Chromega and the Quanta Log make an ideal combination, in any color lab permitting fast, accurate operation using the "Null System" of color balance.

The Quanta Log has a set of attenuators which permit the user to index the instrument against a known negative. An unknown negative is then projected onto the probe and the red filter switched into position. The lens diaphragm is then

adjusted until the needle rests on zero. The green filter is switched into position and enough magenta dialed in until the needle rests on zero. At this point, if you switch back to the red filter, you will find that you have to readjust the lens diaphragm to bring the needle to zero. Upon returning to green, you will have to adjust the lens again. The same procedure is followed for the blue filter.

In actual practice, the entire procedure is accomplished in about three minutes. Results on a first print are much closer than with any other system tried. The rechecking and readjustment are necessary because the magenta and yellow filters transmit some cyan and must be compensated for.

LogEtronic C for color

In another new unit, the LogEtronic C enlarger, the printing paper is actually exposed in three sequential exposures. One exposure with a red filter, one with a green and one with a blue. Different amounts of feedback can be used for each of these exposures, depending on the requirements of the particular negative. When the LogEtronic's phototube is panchromatic (no filters in front of it), the resulting print will exhibit the same properties as one made with three separate photographic masks, each mask being made without a filter.

To achieve the same effect as with color correction masking, a separate set of filters can be introduced between the beam splitter and the phototube. In general, these filters will be the complements of the filters below the lens. A cyan filter would be used in front of the phototube when the red filter is below the lens, magneta when the green filter is below the lens and yellow with the blue filter. The specific filter colors employed will depend on the specific dyes or inks for which the color is being corrected.—THE END

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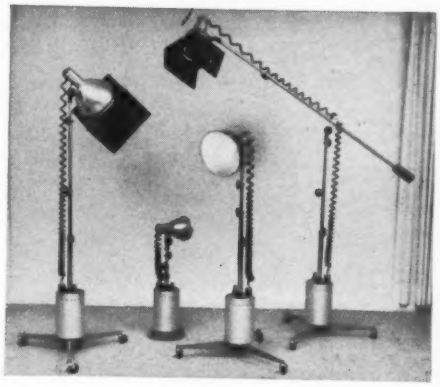

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by Arnold Eagle

INDUSTRIAL MOTION PICTURES

The challenge of tape: a bumper crop of motion picture equipment

The arrival of a new year always makes us wonder what ever happened to the old one. Somehow it went by so fast that it did not seem there was enough time to accomplish much. But one field which made the most of the time was motion pictures. Great progress was made in equipment, processes, materials, etc. It is becoming quite a job to keep up with the new developments.

Probably the most significant development, one which can affect the whole future of film making, was the rapid acceptance by the television industry of the Ampex Videotape recorder (first introduced in 1956). This tape makes possible the recording of a visual image on magnetic tape. Although the current Ampex models are expensive and bulky, considering the needs of the industrial film maker I am sure it is only a question of time before a less expensive, more portable model will be available.

It is possible that someday the images on magnetic tape may replace the conventional film camera. It might be a good idea for the young cameraman who expects to age gracefully in this field to learn all he can about this tape.

Quarter-inch sound tape recording for movies made great strides with the appearance of very portable, battery-operated, high fidelity tape recorders, such as the Swiss-made Nagra. When fitted with a Rangertone 60 kc synchronizer or a Fairchild 14 kc synchronizer it is capable of the most exacting lip sync. Another portable battery tape recorder, also Swiss, is the Perfectone. Distributed in the East by Magnapix and in Hollywood by Ryder, it has been used successfully on many a feature film.

It would be unfair to omit from this discussion an excellent English recorder, the E.M.I., which gets credit for starting the trend toward high fidelity tape recorders. It weighs 14½ lbs. and is distributed in New York by Ercona, 16 W. 46th St., New York, N. Y. Another English machine, from Lieber and Rich, should reach the American market next year. Stancil-Hoffman of Hollywood makes a battery-operated recorder for film.

Sound-time machine

Speaking of sound, there is a fascinating sound service offered by Filmsounds, Inc., 128 E. 41st St., New York, N. Y. They have a "sound-time" machine that they import from Germany which can take any sound track and shorten or stretch it without changing the pitch. This means they can fit a piece of music to a film without having to cut out phrases or adding pauses. The machine, however, is also capable of changing the pitch without affecting the tempo if this effect is so desired. They can also sync and out-of-sync speech.

Wonder gadgets like these are most helpful in doing chores which could not otherwise be done but it is the improvement in everyday equipment which is most helpful to the industrial film maker. For example, the fluid pan head which feels like a gyro head yet is noiseless and costs much less. An improved model of the Miller Fluid Head, distributed by Florman & Babb, 68 W. 45th St., New York, N. Y., is now available. Camera Equipment Co., 315 W. 43rd St., New York, N. Y., makes the Pro Junior Fluid Pan Head with a positive tilt lock and a silicone polymer fluid that is unaffected by even the coldest temperature. S.O.S. Cinema Supply Corp., 602 W. 52nd St., New York, N. Y., announces its Visco-matic Fluid Head which sells for under $100.

Then there is the Kenyon Gyro Stabilizer, a small gyroscope which weighs only 28 oz. Described in my July 1959 column, it permits a steady, hand-held operation of cameras like the Arriflex and Cine Special. It is handled by Florman & Babb in

New York and Gordon Enterprises, 5362 N. Cahuenga Blvd., N. Hollywood, in Calif.

Improvements have also been made in camera design. The 16mm Arriflex has a much needed buckle switch which also stops the camera motor when the film runs out. With a Gaumont-Kalee sound recording unit added the Arriflex becomes a single-system sound camera, using magnetic striped stock. The magnetic sound head of the unit fits under the camera and the film runs through it from a slit made in the bottom of the camera.

Cinephonic 16

Fairchild Camera and Instrument Co., 5 Aerial Way, Syosset, L. I., N. Y., has acquired exclusive marketing rights to the only magnetic single-system camera, the Cinephonic 16, made by Magnetic Sound Camera Co., Chicago, Ill. This camera can be used in conjunction with the Fairchild Mini Rapid 16 automatic film processor. A scene shot in the Cinephonic 16 camera can be processed in the Mini Rapid and be projected with sync sound 5 min. after it is out of the camera.

A camera development of unusual promise is the new Mitchell (Mitchell Camera Corp., 666 W. Harvard St., Glendale Calif.) just going into production. It is a 35mm lightweight through-the-lens focusing reflex with a brand new shape. It will use 400-ft. magazines, have a three-lens turret and the Mitchell registration pin movement. Weighing only 15 lbs. it is designed to be hand held. A silent movement will make it ideal for sound.

New lenses have also joined the parade of progress. Karl Heitz, 480 Lexington Ave., New York, N. Y., announces a set of Kinoptik Apochromats, focal lengths from 5.6mm to 500mm. Bell & Howell brought the Angenieux Zoom Lens, at f/2.2 with a range of from 17mm to 85mm. Paillard, 100 Sixth Ave., New York, N. Y., has a new f/2 Reflex Zoom Lens for 16mm. The range is from 17mm to 85mm and focusing is through the lens. This lens can be used on any camera with a "C" mount eliminating parallax problems.

A new blimp for the 16mm Maurer is available from Camera Equipment Company.

Lowel-Light, portable light fixtures for RFL bulbs are now in production. A set of six, without bulbs, fits into a case smaller than a shoebox. It can be mounted on a wall with special tape or on molding or stands with a notch and chain grip.

(*continued on page* 34)

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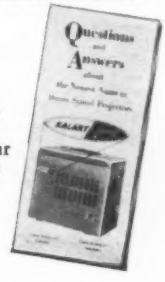

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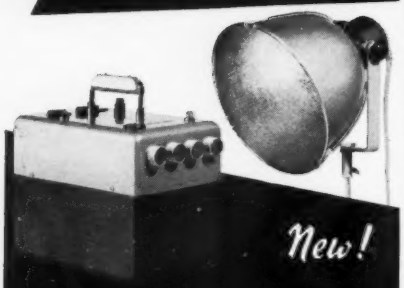

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by Edward R. Farber

ELECTRONIC FLASH

Observations on three newcomers making the electronic flash scene

New flash units continue to make their debuts faster than photographers can make up their minds about what they are like.

For the many photographers who prefer the weight on their hips, Braun has introduced the new Hobby "Ultra Miniature" unit with a 3.2-oz. lamp head and a 20-oz. power pack. This is little enough and combines the careful engineering and practical styling for which Braun is noted.

The 40-watt-sec. pack has a maximum recycle time of ten seconds, an indefinitely rechargeable nickel- cadmium battery and a 1/1000 sec. flash duration. There is a minimum of 40 flashes per charge and a reflector angle of 65° horizontal and 60° vertical.

The wallet-size power pack is only 1.2 in. thick, 3.9 in. wide and 5½ in. high. The lamp head is 1.4 in. high, 3.15 in. wide and 2.16 in. deep.

The point of giving dimensions down to 1/100 in. escapes me. I believe this to be a very competent product but I was floored by the amount of material in the press release which must have weighed as much as the unit. The release praised the superiority of the flat, high voltage capacitor. The Model T Ford had flat, high voltage capacitors in the ignition system and the 1939 Stroboflash had flat wound, oil filled capacitors made by GE. Flat electrolytics were also used during the early days of AC radios.

The release went on to state that the unit does not draw out heavy "damaging currents" from the battery (but uses a constant current circuit as do "ordinary" flash units and earlier Braun units which have survived this "damaging" for years).

Conceived in weltschmerz

It even told how the designer spent six solitary months on a mountain top before giving birth to this "climate stabilized" circuit.

After perusing reams (actually 30 pages) of mimeo paper, I still do not know over what range of temperature this unit will function, whether it will function in the rain, whether the trip lead could be connected in parallel with another Braun unit to trip two lights, whether it can be used with two lights or whether I can charge spare batteries when not inserted into the power pack or must I tie up the pack to do it. But I *can* tell you that one of the company executive's has relatives in Des Moines.

Rectablitz: How small is the smallest unit?

Somehow the consumer does not have a chance when publicity men are around. Take the claim that the lamp head is the "smallest, flattest, lightest flash head ever devised." The head seems no smaller than that of the Rectablitz, introduced at the 1955 Paris Photokina. It would be nice if the promotional literature could match the simple integrity and usefulness of Braun products.

Eastman Kodak reminds electronic flash users that modeling lights have been responsible for yellowish overexposed prints when slow shutter speeds are used on type S Ektacolor. Shutter speeds faster than 1/25 are suggested.

The new Mecablitz 102 and 103 units are electrically similar. The 102 is a two piece unit while the 103 combines lamphead and power pack. Both units have rechargeable dry battery and a monitoring circuit to conserve the battery during idling. The battery is rated at about 75 flashes per charge. Recycling time is eight seconds and flash duration is about 1/1000 second. The reflector beam angle is 65 degrees. The Ektachrome guide number is about 43-49. The $59.95 price includes battery and separate charging unit.

The press release from the Meca-

(*continued on page* 34)

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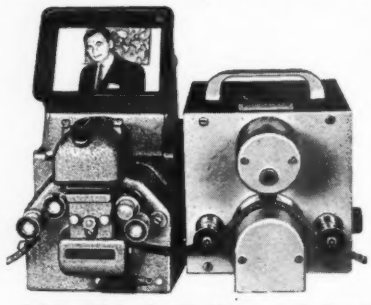
- Individual Framing & Focusing Controls.
- Hi-Power projection lamp—easily replaced.
- Flip-up design allows cueing right on the film—no frame loss.
- Truly a Lab-Test Film Inspection System.
- Shows up normally undetected flaws in film.



S.O.S. Ediola Sr. M Viewer and Sound Reader Combination (left to right) $320

S.O.S. Ediola Sr. Viewer MRL and Sound Reader Combination (right to left)....$395

S.O.S. Ediola Sr. Action Viewer Model M (left to right) $135

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ELECTRONIC FLASH

(*continued from page* 32)

blitz people states that electronic flash users are divided into two camps—those who want the one piece "monopack" and those who want the bulk of the weight on the shoulder. As a member of the Speed Graphic school, this user does not find two pounds on the camera any burden at all. However, I am frustrated by neck straps, power packs, and gadget bags with power cords and sync cords tangled in between. I await with little hope the integrated camera with electronic flash and motor drive built in, operated from one battery. This camera should also have a two lens turret and a removable flash reflector. This would also remove two of the problem children of portable electronic flash units —sync cords and power cords where most failures seem to occur nowdays. I do not feel that a small camera makes a photographer inconspicuous; even with a Minox, when he puts a camera to his eye, everyone knows he is taking pictures.—THE END

IND. MOTION PICTURES

(*continued from page* 31)

Lowel-Light Photo Engineers are at 421 W. 54th St., New York, N. Y.

The Reflectal is another very useful item. This is a highly efficient reflector which opens and closes like an umbrella. Made of aluminized Du Pont Mylar polyester reinforced fabric, it can be mounted on a stand and used either indoors for indirect lighting or outdoors as a sun reflector. The distributor is Photo Lectronic Research, 141 W. 42nd St., New York, N. Y.

Eastman Kodak came out with three new films last year, pointing to increased film speeds with color materials. First was 16mm Ektachrome Commercial, Type 7255, to replace Kodachrome Commercial. Then came Type 5250 Color Negative with an exposure index of 50 tungsten, 32 daylight. This is twice as fast as Type 5248 and the film is said to be finer grained. Finally, there are two new 16 and 35mm color films, SO 260 and SO 270, (SO means Special Order). The SO 260 is Daylight Type Reversal and carries a basic index of 160; SO 270 Type B carries an index of 125 tungsten and 80 daylight (with Kodak Wratten Filter No. 85B). The sample I used at these ratings held the color beautifully and showed very little grain. Kodak has announced that indexes up to 500 have been used for missile data recording.—THE END

METHODS FOR TOMORROW

(*continued from page* 14)

also been changed to comply with average pictorial requirements rather than to a specific average gradient. In the proposed standard the degree of development is specified as that which will result in a gamma of 0.7.

New method for designating speed

The 1954 standard, and earlier versions, defined speed as equal to 1/E where E is the exposure (expressed in meter-candle-seconds) corresponding to the point on the D-Log$_{10}$E curve previously described, i.e., the point where the gradient of the curve is 0.3 the average gradient over a log$_{10}$ exposure range of 1.5. The speed values were given arithmetically on a cube-root-of-2 basis. These values were not intended for use in conjunction with exposure meters and calculators, and to distinguish them from exposure index values they were written with the prefix zero. E.I. values, applicable to exposure meters, etc., were defined as S/4. Thus, a film having a speed of 04000 would have an exposure index of 1000 in the arithmetic scale. An alternate logarithmic exposure index scale was also provided, equal to 5–10 log$_{10}$ E, for use with foreign-made exposure meters marked in logarithmic units.

It is now proposed that ASA Speeds be employed and that exposure indexes, as such, be abandoned. The new speed values will be determined by the revised method and will not have a zero prefix. They will be given on a cube-root-of-2 scale in the arithmetic series and will also be expressed on a log-to-the-base-2 scale. On the arithmetic scale the new ASA speeds for black-and-white films will be numerically about double the previous exposure index values.

The adoption of a log$_2$ scale for the logarithmic speed values has behind it a long range program which, if it takes hold throughout the photographic industry, will lead to a simplified, additive system for determining lens and shutter speed settings for any film and lighting condition. Part of such a system is already in existence, known as the exposure value system. Cameras calibrated according to the EVS have f/number and exposure time scales which in each case differ from value to value by a factor of 2.0. The f/numbers have to be squared to show this relationship from one value to the next. A third scale

(*continued on page* 65)

Check this lineup of ARKAY "professional touch" exclusives

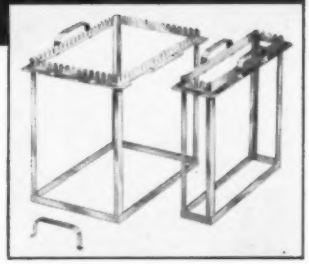
CUTAWAY SECTION
Showing Full ½" Radius on Inside Contour
• FULL ONE-HALF INCH RADIUS ON ALL CORNERS AND CONTOURS
• ONE-PIECE HELIARC CONSTRUCTION
• COATED WITH ANTI-CONDENSATION MATERIAL
• HANDSOME RIGID STAND TO MATCH EACH SINK

ARKAY "Professional Touch" Sinks

. . . are custom-designed especially for top craftsmen in the photographic arts. Designed for those who recognize and appreciate streamlined beauty and utility . . . heavy gauge stainless steel (type 316) construction . . . initial and long-range economy. Arkay one-piece construction prevents accumulation of sediment or chemicals in seams—as occurs in two-piece panel-sinks.

ARKAY AT THE PRICE YOU'RE WILLING TO PAY—OFFERS WORLD'S WIDEST SELECTION OF DARKROOM SINKS*

**In Any Size from 18" x 36" to 47" x 120". . . Splash Panel, Stand and Shelf Optional. Priced as low as $119.50. Or will design to your exact specifications.*



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Conserve time—money—patience—with the *first* rigid, non-rock, non-sway film hanger racks ever developed. Arkay 3-Way innovations:

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Made of 316 Stainless Steel. Available in 5 sizes to fit *all* standard tanks—including Nitrogen Burst Systems. *From $5.75 to $7.25.*

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GRAFLEX 1000 SHUTTER

Fastest Between-the-Lens Shutter Ever Developed for a 4x5 Camera!

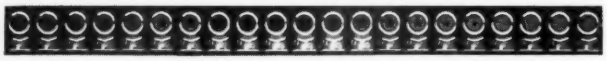
HIGH SPEED PHOTOS PROVE IT

Compare these photos taken with the new Waddell High Speed Motion Picture Camera

Graflex 1000 Shutter
1/1000 Second
Wide Open (1" dia.)

Graflex 1000 Shutter 1/500 Second
Wide Open (1" dia.)

Shutter "B" 1/400 Setting.
Wide Open (1" dia.)



Shutter "A" 1/400 Setting
Wide Open (1" dia.)

You can see for yourself how quickly the blades of this revolutionary new Graflex 1000 shutter open and close . . . in one continuous out and back "orbital" movement, without jarring, shutter-damaging bounce or shock.

Three-times-as-fast as conventional shutters, this speed makes possible the shortest, sharpest exposure times of any between-the-lens shutter . . . as well as optimum synch (with M type flash bulbs, through a true 750th; with "X" electronic flash, through a true 1000th). The new 4 x 5 Super Speed Graphic with this Graflex 1000 Shutter and 135mm Optar lens . . . $449.50. For full information get Super Speed Graphic folder from your Graflex dealer, or write us.

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AN EDITORIAL

VOX PHOTOGRAPHER

On another page in this issue of PMI, a technical editor reviews a sweeping revision proposed in the American Standard of black-and-white film speed. The revision, almost a shoo in, incorporates an approximate doubling of present exposure indices and bases its measurements on a development for considerably lower contrast than does the present standard. ● This should be no surprise to professional photographers. Most of them have already adopted the changes in their standard operating procedure. We mention the matter because it shows the sensitivity in high places to the voice of the photographer. In its guarded style, the ASA news release cites the "heated discussions" which the present standard touches off in workaday photographic circles. The new proposal was designed to meet the needs you, the photographer, voiced and it appears to do so. ● Another tribute to photographers in general, and to photographers in industry specifically, was a front page story in the **Wall Street Journal. Journal** headline writers summed it up with "Firms Spur Camera Use to Solve Test, Sales, Production Problems." Not many executives in the photographic industry missed that one. One photographic firm, the largest in the world it should be added, hired part of a page in **Scientific American** to comment on the article. The original story said that some $250 million was spent annually for functional photographs. Said the photographic firm: "You know something? $250 million a year is peanuts." ● A source of continual shock to us is than many photographers in industry themselves underestimate their function. By and large, the truth is that the photographic industry is eager to serve their needs—and the rest of American industry is wide open for the services of photographers once it knows the benefits.

The Editors

Four Californians handle a record output of record album covers, plus a melange of photographic jobs from photo drafting to a motion picture seen all over the Western World for talent-laden . . .

CAPITOL RECOR

Forty-year-old, ex-Air Force photographic officer Ken Veeder thinks he has just about the most stimulating job there is in industrial photography. As a photographic illustrator and chief photographer for Capitol Records, he guesses he has made more LP album covers than any other man in the business. Shooting show biz and concert stage talent, working with art talent and backed by a talented staff of three, Veeder can't think of a more felicitous place to exercise his own considerable abilities with camera and color film.

Most of Veeder's latter-day graphic arts are performed in the Capitol Tower, a cylindrical building which looks like a giant power line insulator perched above Hollywood and Vine in you know where. Like the building itself, there are no squares inside. And while the nature of album covers demands some lyrical vision as well as a sense of whimsy on the part of the photographer, Veeder's work is strictly business. Since LP, record retailing has gone as self-service as the grocery business. The unadorned single record album cover is about as viable in today's market as a gaslight mantle. The record cover must say in a subtle scream "BUY ME!" Although the photo staff was gratified to receive a 1957 American Institute of Graphic Arts citation, their eyes are on consumer appeal. So is Capitol's Packaging Department which pays the bills for the photos.

The rule in the record business is that album covers are assigned by staff art directors to free lance and studio photographers. Capitol assigns work on the outside too, but it is not unique in considering it beneficial to employ a staff photographer. At least one competitor does so too. Veeder feels that the firm is making good use of his staff; too good in fact. In the face of additional projects from Public Relations, he's making an appeal for more help.

In-plant photography at Capitol started when Veeder, as a cameraman with Hollywood photographer Otto Rothschild, was handling a plurality of publicity shots and album covers for Capitol. Invited to come aboard in 1954, Veeder accepted a staff job with Rothschild's best wishes.

The basic reason for the maneuver from Capitol's viewpoint is the greater liaison it permits between art director and photographer. The comptroller's office was interested too, lest the change increase the cost of record jackets. Careful bookkeeping revealed that it was an economical move besides alleviating the semantics problem—and photographer, artist, sales manager and accountant have been pleased ever since.

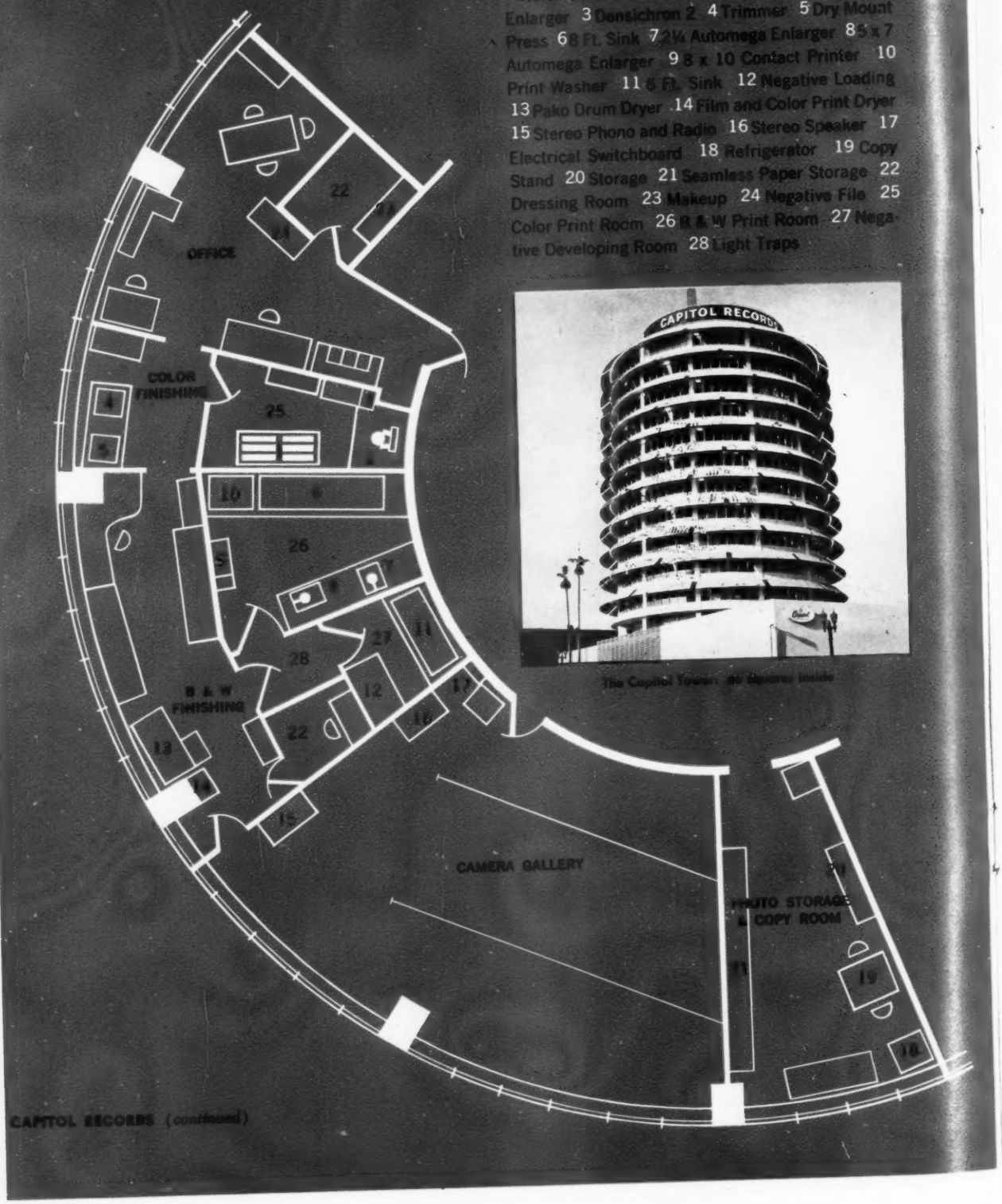
Covers are by no means least in importance in the Capitol photo lab's work, but they are vastly

RDS INC.
Robert J. Burbridge
th Veeder, Jr.
Kinley T.
Takaoka
Gracia Nitzsche

CAPITOL RECORDS PHOTO DEPT.

1 Rotor Color Print Processor 2 Omega D2 Color Enlarger 3 Densichron 2 4 Trimmer 5 Dry Mount Press 6 8 Ft. Sink 7 2¼ Automega Enlarger 8 5 x 7 Automega Enlarger 9 8 x 10 Contact Printer 10 Print Washer 11 6 Ft. Sink 12 Negative Loading 13 Pako Drum Dryer 14 Film and Color Print Dryer 15 Stereo Phono and Radio 16 Stereo Speaker 17 Electrical Switchboard 18 Refrigerator 19 Copy Stand 20 Storage 21 Seamless Paper Storage 22 Dressing Room 23 Makeup 24 Negative File 25 Color Print Room 26 B & W Print Room 27 Negative Developing Room 28 Light Traps

The Capitol Tower, see figures inside



CAPITOL RECORDS (continued)

Originally Veeder shot most record covers on Ektachrome and had Frank Miller's Los Angeles color lab make up Dye Transfer Prints for camera copy. When he first heard of Ektacolor paper (then Type C) he began shooting extras on Ektacolor and Kodacolor film, and experimented with the prints himself. Satisfied that he had the technique to the point where he wanted it, he showed samples to Capitol art directors. They liked them fine. It's been Ektacolor prints almost all the way ever since.

In making a record cover, the routine at Capitol follows somewhat the following procedure. About two weeks ahead of shooting date, Veeder and art director Marv Schwartz discuss the project. Result of the discussion may be a verbally expressed idea, or a layout as seen for Ruth Welcome's "Zither Magic" cover (*see below*). The artists seek props and costumes from the many houses nearby set up to serve the movie capital. About a week ahead of time the shooting session is scheduled. It's generally a two-hour session.

If it's to be a location shot or one made during a performance, Veeder selects the tools and impedimenta required to meet the situation. Location lighting often consists of Colortran Master lights. Working with stage lighting he looks upon his SEI meter as a lifesaver. Its narrow angle of acceptance permits him to take readings from camera position and quickly adjust exposure as houselights dim and the footlights go up.

In the studio, the workhorses are the Hasselblad, the Rollei, the view camera with a 4 x 5 back and a couple of 1000-watt SR speed flash units, a variety of floods and spots and a Norwood meter. Experience is the main guide to electronic flash exposures, but Veeder uses Polaroid Land film to check the lighting arrangement.

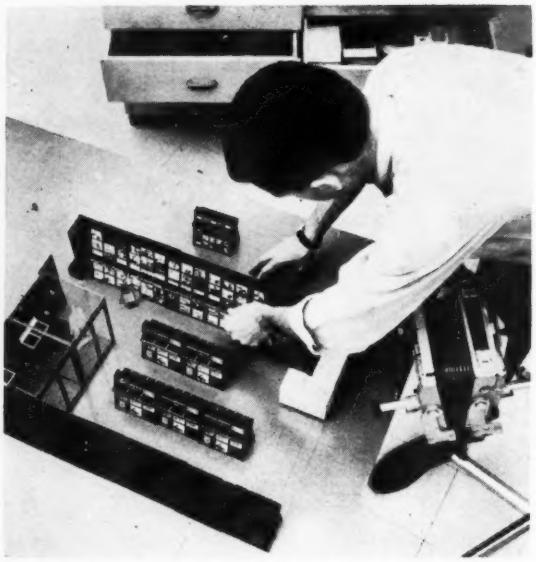
Outside labs process the color negatives. In terms of cost, delivery and convenience, the staff feels that it's best to do them on the outside. Processing would be by the book in any case.

Kinley Takaoka gang proofs the negatives on 14 x 17 paper. He has filter packs set up for each of the shooting conditions used, and his only adjustment for a gang of proofs is exposure. Takaoka determines this at this stage with a flesh tone reading at the easel with his Densichron.

He processes the paper in Saran baskets in a Rolor constant-temperature unit with built in gaseous burst agitation. Artists select the picture from the proofs, and Takaoka makes the first blow-up, usually 12¾-in. sq. to fit the record cover format. A second or third print incorporates fine color corrections—or distortions for mood—suggested by the photo and art staffs. The ability of the staff to influence the final product so directly and quickly is a big argument in favor of the Ektacolor print as far as Capitol is concerned. These benefits extend to product and advertising shots as well as the album covers.

Another color project at Capitol is the sound slidefilm for bi-monthly sales meetings. As these things go, Capitol's is a whopper. The film runs upwards of 2½ hours and includes 200 to 400 frames. Originals include copies of new record and tape release illustrations, candids of artists at the recording sessions and any appropriate devices art and photography can dream up to keep the pace during the show. Music is supplied from the records themselves and the (*continued on page* 72)

Brief history of a record album cover is displayed for the curious at Capitol tower. Idea starts when art director and photo chief put their heads together. It may remain unrecorded or be put down as sketch *(above)*. Art department rounds up props and costumes, photo staff makes the picture on 120 or 4 x 5 color negative film during a two-hour shooting session. (The art director on the job is shown peering through the Hasselblad finder.) Working with same-size Ektacolor print, artists add type, prepare copy for engraver. The steam is CO_2 fog from dry ice.



Sales promotion job consists of photographing scale-model layout of self-service record fixtures designed for a particular retailer's store. Miniature album jackets and silhouette figures add to realism. Finished 8 x 10 glossy is dispatched to salesman for presentation to store manager to visualize effect.

Color print lab keeps Kinley Takaoka busy full time turning out 14 x 17 Ektacolor prints. The size accommodates the 12⅜-in. sq. album format and simplifies work for photographer, artist and engraver. Special equipment includes Rolor basket processor and Densichron. Total output runs to 1800 prints annually.

outnumbered by assignments for publicity and advertising assignments for Capitol artists, music and radio-phonographs. Another big job that falls to the photo lab is sales promotion material aimed at Capitol salesmen and managers, distributors and retailers.

A half dozen or so sales meetings per year, for example, call for a filmstrip presentation running to 400 frames each. More about that later. A merchandising planning service also keeps the records, and the photo department, spinning. In this, a Capitol salesman is the go-between the retailer and experts at the Capitol tower. The salesman states the problem and the experts design a store layout to provide a solution. They work with scale models of store fixtures on a table with grid lines that enable them to match the floor plan of the retailer's store. This done, a photographer moves up his wide-angle lens and view camera and shoots the scene. Prints are shipped to the salesman, who brings them to the store manager, who is so pleased he orders the fixtures installed. Saves a lot of drafting time.

On a count, this is a rough picture of Capitol photo lab's output annually:

Album covers	180
Publicity, advertising assignments	600
Sound slidefilms	8
Self-service layouts	36
Motion picture	1

Analyzed by units produced, the total is so:

Ektacolor prints, 14 x 17	1800
Black-and-white prints	25000

You'd have to be a pretty fast man to handle all this yourself, but Veeder has some able assistance. Cameraman No. 2 is Robert J. Burbridge who went directly to Capitol from the Art Center School, as did Kinley T. Takaoka, who's so busy with those 1800 color prints that he does most of his camera work on his own time. Gracia Nitzsche was hired as a secretary, learned make-up from TV and movie experts after hours to help stage performers adjust to the cosmetic requirements of the camera.

Veeder hired his two staff photographers from the small but steady stream of portfolio carrying Art Center School graduates which flows through his office at commencement time. He is proud of them, thinks they're training was worthwhile and says that he would have gone to the Los Angeles school were he starting from scratch. Salaries, he says, are competitive with comparable work in Los Angeles.

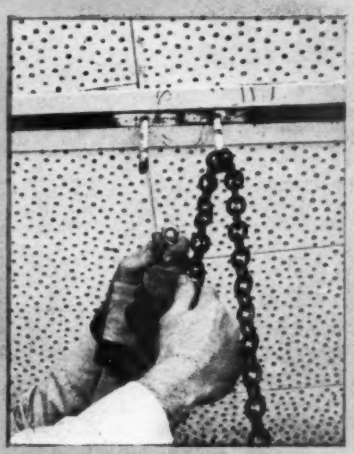
WHAT'S NEW AT CAPITOL RECORDS? MOONGLOW IN PRESSURIZED CANS

To make album cover illustrations you have to be half set designer. Object here was to have spots of light work into precise design on picture. Expedient is illustrated here. A transparent sheet was rolled down from the ceiling. Having selected where he wanted his lights to glow, photographer sprayed the sheet with translucent coating which comes in handy spray cans. Spots brought up behind the sprayed areas illuminated the spots while the background faded into a romantic indigo.

MONTAGE BOARD WITH REGISTRATION PINS CUTS RETOUCHING COSTS

Basically a print easel, the multiple registrations pins along the outside accommodate opaque card stock. The stock may be cut as required. In the illustration shown, it masked two-thirds of the final print while one third was exposed with one of the three negatives used. Effect could have been gained by making three separate prints, but edges would have to be feathered to eliminate lap marks and there might have been print-to-print processing variations. Adjustable legs can tilt easel.

NO TRICK TO IT; IT'S ALL DONE WITH MIRRORS AND SLIDING PANELS



Pictures by Capitol Records and M. Frank Wolfe

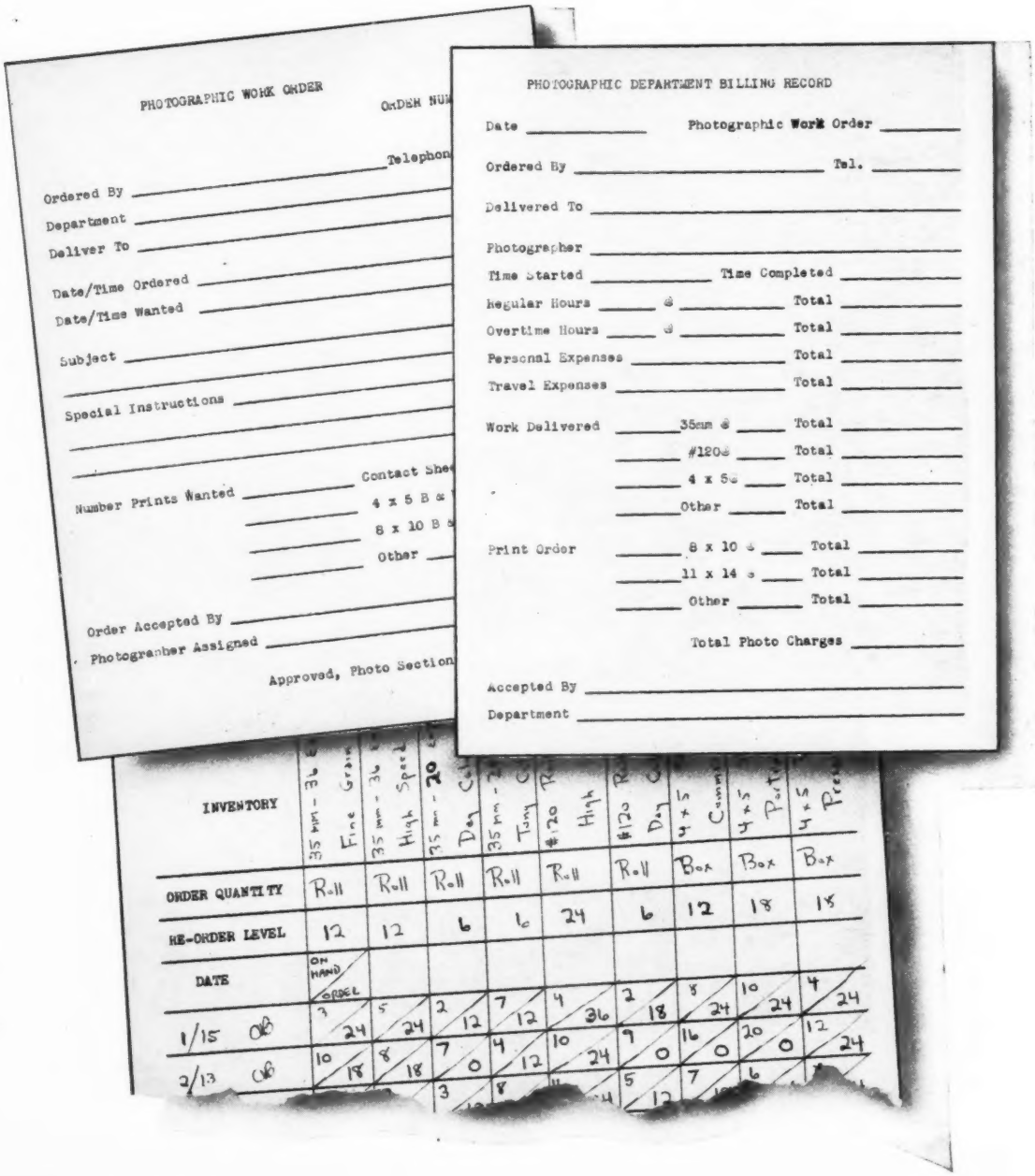
A lens can bug even a professional entertainer. Without a role to play, many find that they can get into the swing of the still shot easier if they can see themselves in the mirror Capitol keeps handy in the photo studio. Stand and rollers make it easy to put it in position. The recessed ceiling tracks hold seamless rolls, lights and what have you in the semi-circular Capitol studio. Not only do they look neat, Capitol photographers say, the tracks move background panels fast.

MEMO ON:

COST A

When it comes to talking business with management, nothing is more easily understood than the figures after the dollar sign.

The road to a richer vocabulary lies in accurate cost accounting



PHOTOGRAPHIC WORK ORDER

Ordered By
Department
Deliver To
Date/Time Ordered
Date/Time Wanted
Subject
Special Instructions
Number Prints Wanted
Order Accepted By
Photographer Assigned
Approved, Photo Section

PHOTOGRAPHIC DEPARTMENT BILLING RECORD

Date _____ Photographic Work Order _____
Ordered By _____ Tel. _____
Delivered To _____
Photographer _____
Time Started _____ Time Completed _____
Regular Hours _____ @ _____ Total _____
Overtime Hours _____ @ _____ Total _____
Personal Expenses _____ Total _____
Travel Expenses _____ Total _____
Work Delivered _____ 35mm @ _____ Total _____
_____ #120@ _____ Total _____
_____ 4 x 5@ _____ Total _____
_____ Other _____ Total _____
Print Order _____ 8 x 10 @ _____ Total _____
_____ 11 x 14 @ _____ Total _____
_____ Other _____ Total _____
Total Photo Charges _____
Accepted By _____
Department _____

INVENTORY	35 mm - 36 Fine Grain	35 mm - 36 High Speed	35 mm - 20 Daylight	35 mm - 20 Tungsten	#120 High	#120 Daylight	4 x 5 Cut Film	4 x 5 Portrait	4 x 5 Press
ORDER QUANTITY	Roll	Roll	Roll	Roll	Roll	Roll	Box	Box	Box
RE-ORDER LEVEL	12	12	6	6	24	6	12	18	18
DATE	ON HAND / ORDER								
1/15 OK	3 / 24	5 / 24	2 / 12	7 / 12	4 / 36	2 / 18	8 / 24	10 / 24	4 / 24
2/13 OK	10 / 18	8 / 18	7 / 0	4 / 12	10 / 24	9 / 0	16 / 0	20 / 0	12 / 24
			3	8		5 / 12	7	6	

ACCOUNTING

It is common knowledge that photographers are by nature sensitive, artistic types who detest clerical work. However, most plant photographers work for managements who have a funny habit of wanting to know the cost of things . . . like photo sections. When management comes for information, it is the wise department head who has answers. To get answers, certain procedures and records are obviously necessary.

One interesting question is, who uses photo service; in other words, who are the customers. Probably the best way of keeping track of customers is through a work order, containing all necessary information on assignments.

A properly made out work order will tell what pictures are wanted, of what type and size, when they are to be delivered, etc. Place should also be provided for any special instructions that the cameraman might need. In short, it should provide all the information necessary for the effective completion of that assignment.

But it should contain more. Perhaps more important from the photo management view is the authorized signature of the person requesting photo service. This not only provides an indication of who uses photography but can prevent any complaints about the volume of personal work.

Keep photography businesslike

In some cases, the photo section is responsible for seeing that work done is for business only, but this involves great possibilities for hard feelings, hurt feelings and just plain embarrassment. In one large photo section the person who orders the work is responsible for its proper use. As far as the photo people are concerned, all they want is an authorized signature to complete the work order.

In other cases, a reminder that pictures made will be charged to the department ordering them is enough to reduce personal work. Unbelievable though it sounds, other departments in the company have their budget troubles too.

The point is that the starting point for any system of cost control is a properly made out work order which provides justification for having a plant photo section.

Once the department has its customers, the next step is to find out how much it costs to give them service. These records are very important to the continuing life and growth of a photo section. Photography being basically a service, managements will have a plant photo section only if they feel they get better service from within the plant than from outside.

The head of a small photo department faced his firm's periodic economy waves with more than the usual equanimity. The reason? He kept careful records to prove that his section not only gave better quality and more convenience but was also *cheaper*. This is the favorite word of comptrollers; if you can prove this point with suitable statistics, you are in.

Cost accounting has two functions. First, it tells management how much money the photo department costs and provides a breakdown of expenses. Second, it provides the photo supervisor with ideas for cutting costs and increasing efficiency. For example, if a cost analysis of the print room shows that it costs as much to finish the print as to take the picture, something is wrong. It might be that a high-priced darkroom man is doing the washing and drying instead of using a lower-priced lab assistant. Frequently, the use of girls for less skilled, but time-consuming operations—filing, drying, keeping the log, etc.—can not only cut labor cost but increase output. One section head estimates that adding a high school girl to his section will increase output at least one third.

Costs fall into two categories, those you can't do anything about (fixed costs) and those you can (variable costs). Fixed costs are items which remain the same no matter how many pictures the department turns out. Typical are expenses like rent, depreciation, salaries, fringe benefits, etc. For billing purposes, they are usually included in determining the basic unit cost or man-hour price.

While each firm will have its own technique for computing overhead costs, a rough estimate can be derived by dividing the total annual cost of the department by the man-hours per year.

For example, if the total cost of the department is $50,000 and there are five people, each of whom works 2000 hours per year, the overhead (or fixed) cost is $50,000/5 x 2000 or $5 an hour.

Where charges are made on the basis of work ordered, not time, this figure can be used to set a basic price. For example, if it takes five minutes to make an enlargement, the minimum charge would be approximately 40¢.

Variable costs can be cut

Variable costs are incurred in providing service and include items like sensitized materials, chemicals, overtime pay, special materials, travel, etc. It is in this area that good management pays off. Better training can cut waste and increase output. Close inventory control is important to check spoilage of sensitized material or petty pilferage.

In billing, fixed and variable costs are added together to arrive at a price which is charged to customers. In some cases, billing is on a time basis with, perhaps, added charges for special materials used for the particular assignment. In other cases a price list is used, customers being charged only for work ordered, so much per print, etc.

The basic cost information—who wants service and how much does it cost—is the same in every company. However, the methods of reporting and computing vary with the accounting procedures in use. The forms are also specialized, in many cases designed for photo use by the accounting or systems peo-

(*continued on page* 64)

GRA

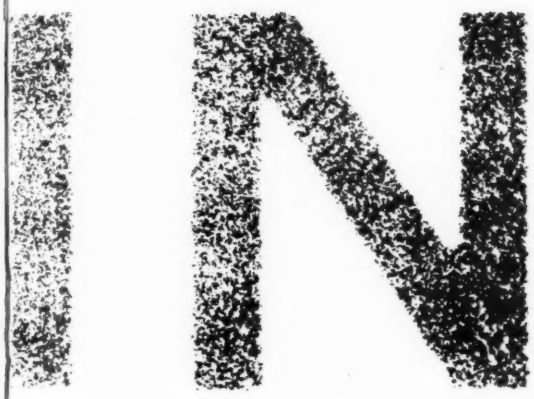
Scotsman H. J. Walls has a penchant for making difficult things clear. In Public life, he makes the workings of science lucid to juries in Newcastle, England, where he is director of the Forensic Science Laboratories. In private life he has set out to make the workings of photography clear to photographers. You can judge for yourself how well he manages this by reading his recent book, *How Photography Works*, published in the United States by the Macmillan Co. As proof of the fact that Dr. Walls considers no concept too formidable for his evangelism, PMI reprints a digression in the book, (with the permission of the publishers) on how the theory of probability affects that old photographic hobgoblin: grain. It bids photographers mind their peas and quinones.

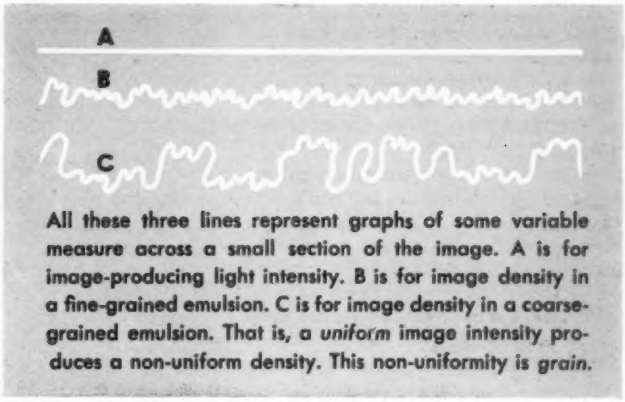
This is a convenient point at which to digress for a few pages, and discuss something which, though it has little bearing on correct tone reproduction, has a great effort on print quality—namely, *grain.*

When very small negative sizes first came into general use about 30 years ago, one of the first things that photographers discovered was that emulsions and developers with which they had previously been perfectly satisfied were no longer adequate. The high degrees of enlargement demanded gave to the images of traditionally-made negatives a peculiar mealy appearance in the print. This is grain.

Grain is the visible result of a small-scale, irregular, point-to-point variation in negative density in areas where image brightness was perfectly uniform or at least showed only a large-scale regular gradient. Grain is always present in every negative image, but is normally invisible until magnified. It is therefore important when a high degree of enlargement is contemplated to keep the scale of this irregular density variation as small as possible—in photographic parlance, to produce a *fine-grained* image.

The grain which we are discussing here is not of course the same thing as the emulsion "grains," which are the micro-crystals of silver halide—discrete separate entities. It is unfortunate that the same word is used in both senses, since this is is apt to lead to con-





All these three lines represent graphs of some variable measure across a small section of the image. A is for image-producing light intensity. B is for image density in a fine-grained emulsion. C is for image density in a coarse-grained emulsion. That is, a *uniform* image intensity produces a non-uniform density. This non-uniformity is *grain*.

fusion. We can perhaps avoid that if we remember that we cannot properly speak of *a* grain in the sense we are now using. Moreover, *grain* in this sense is, by emulsion-crystal standards, a relatively large-scale phenomenon; it usually appears with a magnification of 10 to 15 diameters, whereas it needs a magnification of several hundred diameters to make the individual emulsion crystals visible.

Grain is fundamentally due to the *random distribution* of silver particles in the developed emulsion. This fact is not always as clearly realized as it should be, and deserves a little explanation.

If we throw up a handful of dried peas and let them fall on the floor as they will, they will not there form any sort of regular pattern. They will lie completely at random, and a glance will tell us that they are not uniformly distributed—in one place there will be several peas lying close together, in another they will be widely separated.

Why should the peas not be uniformly distributed? There is no reason at all why they should not. There is nothing in the physical laws of nature which says that, if we drop 64 peas on to a chessboard, they shall not land so that there is one pea exactly in the middle of each square. It merely does not happen in practice for the simple reason that a regular distribution is unique, whereas there are very many possible random ones. The odds against a regular one turning up are therefore very large.

It is so rare an event for four hands at bridge to be dealt so that each contains all 13 cards of one suit that many regular players never see it happen in their lives. Yet this distribution, which is the playing-card analogy of the peas and the chessboard, is no less and no more probable than any other. It is excessively rare merely because it is only one out of the enormous number of possible ways of dealing 52 cards among four players.

The odds against such a regular distribution occurring increase fantastically with the number of items distributed. Suppose we sketch out a "board" for a game of noughts-and-crosses, then set out to discover in how many ways we can produce a *regular* pattern of occupied and unoccupied squares. Let us define a regular pattern as one in which *alternate* squares are occupied. On this definition, two regular patterns are possible, with either 4 or 5 squares filled:

X		X
	X	
X		X

and

	X	
X		X
	X	

Now the number of ways in which either 4 or 5 squares out of 9 can be filled in is the same—126. That is, there are 252 possible distributions of 4 or 5 occupied squares. As only 2 of these are regular by our definition, the probability of regular distribution occurring by pure chance is 2/252, which is about 0.008; in other words, the odds against a regular distribution are 126 to 1.

If the "board" had 4 squares each way—that is, 16 in all instead of 9—there would again be only 2 regular distributions, namely but

X		X	
	X		X
X		X	
	X		X

and

	X		X
X		X	
	X		X
X		X	

the total number of possible distributions of 8 occupied squares in a total of 16 is already over 460,000. Therefore the odds against a regular distribution occurring by chance are in this case about 230,000 to 1.

With a 25-square "board" the odds are over 1,000 million to one. With a 1,600-square "board" such as is shown in the diagram on p. 48, the odds against the regular distribution shown there on the left occurring by chance when 800 squares are filled in are about 4×10^{479} to 1. This is a number so unimaginably large that it is quite meaningless. (For example, according to Eddington, there are probably only about 10^{79} particles *in the whole universe.*)

Now it is, as far as all our information goes, a purely random

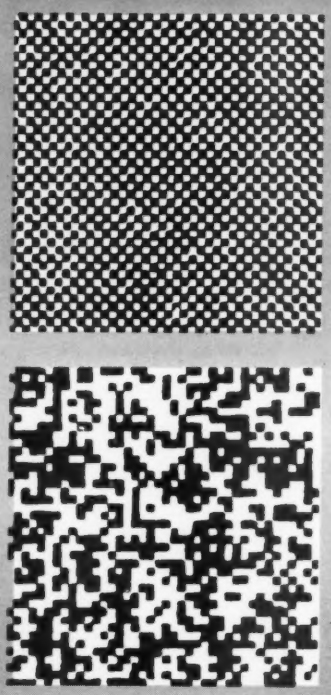
event when a quantum makes a particular emulsion grain developable, just as it is a purely random event if a pea lands on a particular spot on the floor. It is not hard to realize, therefore, that, in a developed emulsion containing, not a few hundred, but millions of randomly produced silver particles, there is not the faintest chance on this side of the end of time of a perfectly regular distribution occurring. There will *invariably* be places where the particles lie close together and others where they lie rather far apart. It is these places which we see in the enlargement as grain.

Grain is not therefore the work of some gremlins whose task it is to harass the photographer. It is, like the lens aberrations we mentioned in Chapter II, a completely unavoidable consequence of Things as They Are. We cannot eliminate, we can only reduce it. And even to do that we must be prepared to go to the trouble which upsetting the natural course of things always entails.

Grain is not a phenomenon easily subjected to exact quantitative investigation. Scientifically, it has a subjective and an objective aspect. The former is known as *graininess.* It is usually measured inversely by the greatest distance from which grain in a magnified image can be seen, or by the least degree of enlargement required to make it visible.

The objective aspect, which is known as *granularity*, has still not been satisfactorily defined. At least seven different quantitative relationships have been proposed as a measure of granularity; unfortunately, although all these can be measured easily and accurately, none correlates at all well with observed graininess. There *is* no doubt some measurable objective factor whose magnitude determines how much grain we see—but no one has yet discovered just what it is. Let us therefore say here simply that granularity is the degree of "wiggliness" of the micro-density traces shown in the diagram on the preceding page.

Graininess is clearly the more important quantity to the practical photographer. Both it and granularity depend in practice on (1) the emulsion, and (2) the development it receives.



GRAIN & STATISTICAL LAW

Each of these two squares originally contained 1,600 spaces, of which 800 have been filled in black in each. On the top every alternate space has been filled in—a *regular* distribution. On the bottom, the distribution is a *random* one, having been based on a statistician's table of random numbers. Which square shows the most "grain"?

Although the random irregularities which constitute grain are not the emulsion crystals, and are very much bigger than these, the two things are not unconnected. Other influences being equal, small crystals lead to fine grain and vice versa. There is no mystery about why this should be so. The clumps of particles which a random distribution produces can consist of any number of particles from 2 upwards. For any given density of particles "on the ground," however, the clumps will have a statistically predictable average size, and those containing many more or fewer than this will be relatively uncommon; in particular, when we are considering only larger-than-average clumps, the bigger the fewer. Clump size, in fact, shows what is called a *Gaussian* distribution, of which an example appears in a curve showing the distribution of molecular velocities. It is obvious, therefore, that for a given clump-size distribution, an emulsion composed of small crystals will have fewer large, grain-producing clumps than an emulsion composed of large crystals.

As we may remember, however, small emulsion crystals are less photosensitive than large ones. Emulsions which are really fine-grained are therefore also slow. Photographers persist nevertheless in demanding in one and the same emulsion the incompatibles of speed *and* fine grain. The manufacturers do their best to keep speed up and grain size down simultaneously, and, by making use of every known trick of emulsion technology, they have been extraordinarily successful. All the same, their success has been limited—high speed and fine grain remain incompatible.

It is well known that graininess and granularity are also influenced by development, although this is much less important a factor than the nature of the emulsion. Fine-grain development has for long been a favourite field for the exercise of the experimentally minded photographer's ingenuity. The heyday of this activity was in the 1930s, when some extraordinary "soups" were perpetrated, containing sometimes such a catalogue of doubtfully useful and even mutual-

ly antagonistic ingredients that eye of newt and toe of frog seem tame stuff by comparison.

With any emulsion, a very energetic developer produces rather coarser a grain than does a less energetic one. This is probably due to some of the silver being deposited outside the crystal boundaries causing the crystals to "swell" in an irregular fashion and encouraging adjacent crystals to unite. This of course exaggerates the effect of the statistical clumping.

In practical photography, the real problem is not the production of fine grain, but the retention of fine grain *and* emulsion speed. If the latter is of no interest to us, fine grain presents no particular problem. Recently a German experimenter, using an ordinary fast emulsion, and a developer containing only hydroquinone, sodium carbonate, sodium sulphite and potassium bromide, succeeded in producing a grain finer than that given by a much-advertised commercial ultra-fine-grain developer. The practical disadvantage lay in the fact that he had to give twenty times the normal exposure.

Minimizing grain

There are in practice three ways by which grain can be minimized in development.

1. By developing to a low gamma—that is, by stopping development early, before serious crystal deformation and "chemical clumping" occur. This is, in effect, how fine-grain developers of low alkalinity such as the Kodak D-76 work.

2. By adding a silver-halide solvent to the developer. This is usually either a high concentration of sulphite, which has a slight solvent action, or a thiocyanate (the ion CNS—). The chemistry of their solvent action for silver halides is the same in kind as that of hypo, and differs only in degree. The theory of the production of fine grain in this way has never been completely elucidated. However, it seems reasonable to suppose that, if those portions of the emulsion crystals which are farthest from the point of developer attack are dissolved away before development reaches them, the gap between adjacent crystals will be increased, the crystals will be less likely to coalesce, and chemical clumping will be less liable to occur. However, the efficacy of such developers may also be due in part to silver ions passing into the developer, which thereby becomes to some extent a physical one (see below).

3. By using certain specifically fine-grain developing agents, mainly the phenylene diamines and their proprietary modifications. Precisely why these produce fine grain is unknown. They are however slightly solvent of silver halides, which no doubt at least partly explains their efficacy.

In spite of the claims made for it, it is not certain that *physical development* does, *for equal density and gamma,* produce finer grain does, no one can say just why.

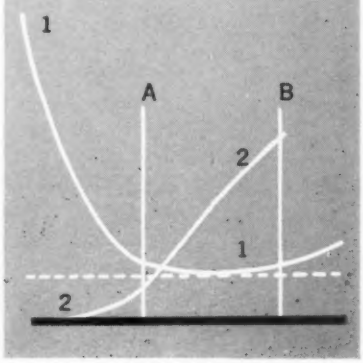
Purely physical development is never used in practice, but any developer in which an appreciable concentration of silver ions is present is partly physical in action. How far the reduction of grain by such a developer is due to its quasi-physical action then depends on how far the claims of physical development to produce fine grain can be substantiated.

Graininess, but not granularity, is also markedly dependent on the *density* of the image, being greater in areas of medium density than in those of high or low density. Anyone who has ever made a grainy enlargement can confirm this for himself. Although the granularity of the negative image from which it was made may be the same everywhere, such a print frequently shows obvious grain in, say, a grey sky, but not in its highlights or deepest shadows.

The explanation of this is partly photographic, partly physiological. The highlights of the print correspond to the flat toe of the paper characteristic curve, and granularity in these areas, being reproduced with low contrast, is not very noticeable. In the shadows of the print, the absolute luminances are small, lying at a level at which the eye is less sensitive to small changes in luminance (*see curve left*). The grain is therefore less noticeable. One has only to examine the enlargement in a very bright light to confirm this last point.—THE END

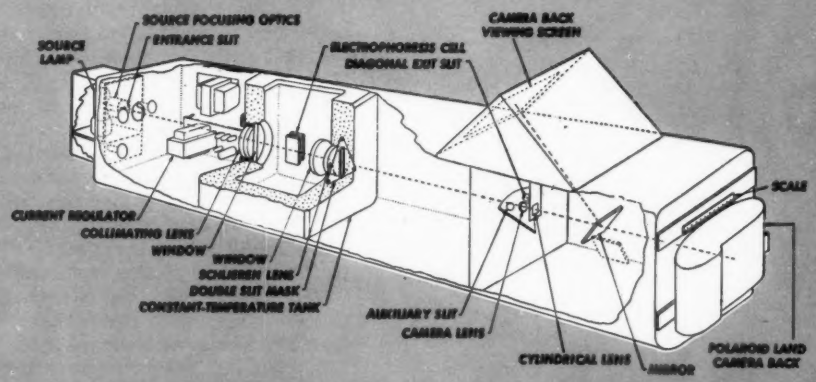
PROPERTIES OF THE EYE

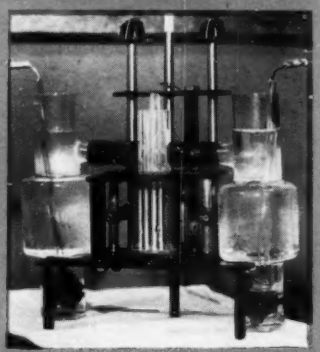
Curve 1 shows how the least perceptible relative change in intensity varies with the absolute intensity of the light. In a very dim light only a large relative change is perceptible; in a moderate light (A to B) the least perceptible change is fairly constant; in a very bright light discrimination falls off slightly, and the least perceptible change becomes greater again. (Intensity A is about that of moonlight, intensity B about that of a white surface in diffuse daylight.) The *Weber-Fechner Law* says that the least perceptible relative change is the same for all intensities; if the Law were strictly true, curve 1 would follow the horizontal straight dotted line. The graph shows that the Law is approximately valid over the intensity range A-B. Curve 2 (after data published by R. W. G. Hunt) shows how *sensation* of brightness varies with *stimulus* (i.e. intensity of light); it is in fact the characteristic curve of the eye. The curve also shows that sensation is proportional to stimulus over the intensity range within which the Weber-Fechner Law holds.



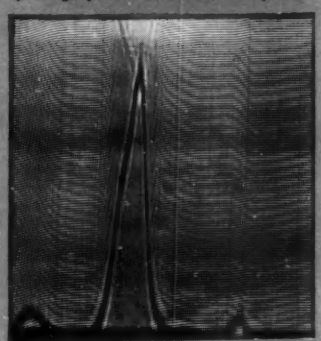
PURSUING THE PROTEIN MOLECULE

Pursuit of the protein molecule begins where the optical microscope leaves off. Involved are such sophisticated techniques as electrophoresis, ultracentrifugation and electron microscopy. These, however, can find the molecule but they can't catch it. For that, you need photography. In the words of Paul Gross, Associate Professor of Biology at NYU and a member in good standing of the posse, it is an "indispensable tool" for his research.





Tiselius cell holds protein solution photographed as schlieren pattern.



ELECTROPHORESIS MEASURES THE CHARGE OF A MOLECULE

Diagram is a cross-section of an electrophoresis apparatus, this one made by Perkin-Elmer. Light passes from a mercury argon light source through the protein-and-buffer solution, then through a schlieren system to a ground glass or film. Tiselius cell *(upper right)* which holds solution (protein and buffer) is placed in water 1° C. Water temperature is kept within ± 1/100° C to minimize molecular movement. Result is picture *(lower right)*. Large peak is Rayleigh fringe pattern, showing change in refractive index. Wavey lines are dn/dx curves, showing separation of molecules due to their charge. Each substance has characteristic pattern which identifies it. During analysis, it is compared with known pattern to identify substance.

Dr. Paul R. Gross, Associate Professor of Biology at New York University, needs only one word to evaluate the role of photography as a research tool in his work. The word is "indispensable."

This is a term which has become rather elastic of late, covering a variety of virtues from minor convenience to vital necessity. However, in the cast of Dr. Gross, his use of the term is quite accurate.

The reason lies in the nature of his research, investigating the function and makeup of the cell.

Although the cell is a simple organism in which occur the first clear signs of "life processes," its study involves fairly sophisticated techniques. It is no longer possible to observe, describe and classify; biologists are probing into the molecular structure of the cell and into the molecules themselves. This has necessitated calling on chemistry and physics for aid and the utiliziation of fairly complex methods of analysis. The data concerned are a stream of electrons, a light wave or an electric charge, none of which can be permanently recorded without the use of an intermediary. This middle man of science is, of course, photography, or more accurately, photographic methods.

Dr. Gross makes use of three major instruments in his investigations into the cellular macromolecule: the electrophoresis apparatus, the electron microscope and the ultracentrifuge.

Electrophoresis is the movement of particules suspended in solution under action of an electric current. In use, the protein solution to be studied is placed in a buffer solution in a Tiselius cell.

A charge is placed accross the terminals of the cell and the pattern and boundary formation observed on a viewing screen. The image consists of two components. First is the Rayleigh fringe pattern which indicates the change in refractive index of the substance under observation. The second is a series of waves or lines, the dn/dh curve which records the separation of molecules due to their charge. This charge is a function of the ph of the solution. By comparing the refractive index and charge with recorded data, the investigator can determine the chemical makeup of the protein solution.

A similar method is used to examine blood. Each of the blood's components has its particular pattern. By comparing the known pattern with the observed condition, a pathological condition can be found and often identified.

In use, the electrophoresis apparatus (the one at NYU was made by Perkin Elmer) resembles an optical bench, about five feet long. A mercury argon light source is at one end with light being di-

(*continued on page* 73)

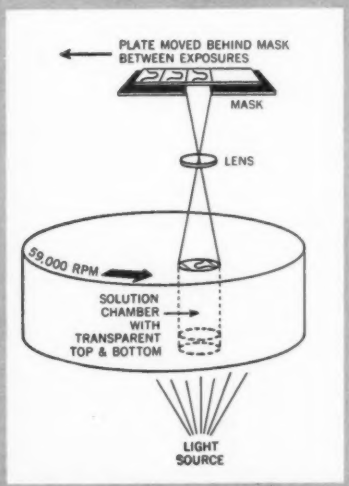
Rat liver cells at approximately 40,000X

ELECTRON PHOTOMICROGRAPH

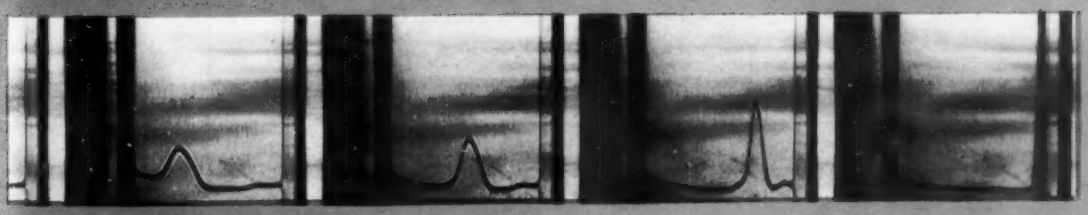
of rat liver cells closely approaches macromolecule. Degree of magnification, scale, are approximate. Electron microscopes give highest resolution.

ULTRACENTRIFUGE PATTERN

shows solution being pulled apart. Pictures were made at 6 minute intervals, right to left. Peaks descend as separation occurs. (Diagram at right omits mirror which bends light 90°.)



Schematic diagram of ultracentrifuge



PORTFOLIO NO.19

If nothing else attracted the world's attention to industrial photography, the Photographic Library at Standard Oil Co. (N.J.) would do it. It is no exaggeration to say that pictures from the library have found their way into print countless times. There are ninety-five thousand photographs in the active file, and some sixty thousand more in an inactive, historical file. There is hardly a picture editor who does not know of the library. Magazines from *Fortune* to British house organs have done stories on its effectiveness. It would be a safe bet that no American school boy could advance from grade 1 to high school without seeing a picture from the library in one of his texts. Its success is as great as its scope.

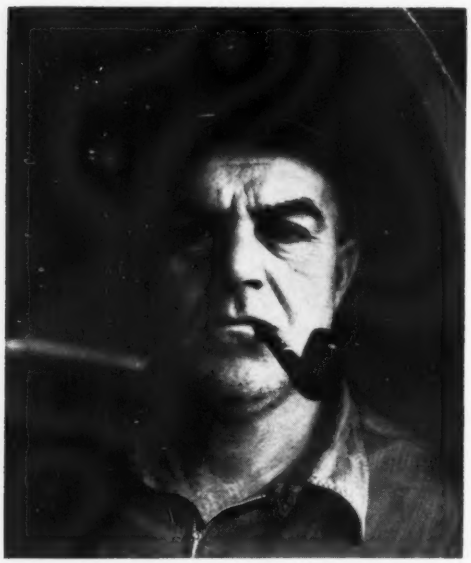
Boiled down to a shibboleth, the point of the Standard Oil Library was at once simple and subtle. "There is a drop of oil in everything." The picture of workmen loading case oil at Barrancabermeja, Columbia, *(above)* and the one of the Great Belt Ferry crossing from Sealand to Nunen, Denmark, *(right)* carry the idea to its conclusion. They document the fact that oil is bound up with the movement of man. Exploring the library, the viewer can only conclude that oil is basic to our culture and economy. The photographs demonstrate it. No words could.

At the urging of its PR counsel, Standard Oil sought Roy Stryker to begin the Photographic Library in 1943. An ex-Columbia economics professor, Stryker had been recruited for the New Deal Brain Trust and set up the Farm Security Agency photographic project to show the ravages of dust and depression. He made no pictures himself; his talent lay in goading photographers to do so. Recalling his first days at Standard he says, "We had one drawer full of pictures. And what did the pictures show? Derricks and clouds. I never saw so much fluff." The thought of a cloud negative makes him shudder.

Standard was as eager to do a proper job of establishing the library as the man they hired to execute it. The management backed him with a budget and the elbow room to exercise his individualism.

Stryker's voice is at once soft and sarcastic, rapid and rambling. As he recalls a typical asignment, he barks like a drillmaster: "GO DOWN TO THE REFINERY AND STAY THERE UNTIL YOU GET PICTURES; AND REMEMBER THAT *PEOPLE* RUN THAT PLACE!" The photographers remembered. In '43, as free lancers, they received $150 per week plus expenses for their work. At least in part, however, it was a labor of love to work for a man with Stryker's standards of craft and authenticity. The cotton batting clouds disappeared from the pictures of tugs, farms and tractors. But Stryker wanted more than pictures from his regulars. He did not subscribe to pictures for their own sake and insisted on purposefulness and captions, the bone of much contention. Another principle he would pepper at his staff was courtesy. He had no patience with the photo boor.

STANDARD OIL photographers almost comprise a who's who of industrial documentary work. Roster includes Gene Badger, Charlotte Brooks, Esther Bubley, John Collier, Harold Corsini, Arnold Eagle, Sol Libsohn, Nelson Morris, Gordon Parks, Edwin and Louise Rosskam and John Vachon. At its busiest a staff of four kept tabs on pictures and greeted editors, textbook writers, agency men and others seeking material — explaining for example that the camels (*right*) are filling up at a well dug to supply water for wildcatting in Saudi Arabia, then turned over for local use.



SO great was industry interest in the photographic library as a public relations tool that in 1955, a fact sheet was mimeographed for the curious: ". . . an outside laboratory, on a contract basis, develops all exposed film, keep negatives in glassine envelopes, in kraft paper jackets. . . ." It does not explain how one can foretell the value of portraits of tug engineers and drilling crewmen (*above*). No new pictures are being made specifically for the library today. Stryker has left. Reminiscing on the project, he mused, "Sometime it will be a valuable document on American life."

A CAR IS a gleam in a Young Adult's eye. A gleam as old as excuses, and new as automatic shift. Pride? Sure. But more. A car is the mirror and measure of his special way
The tense dash to work in the morning... The lan-
Sunday when someone casually said, "Let's go for
ive"—and somehow it grew into an all-day picnic...
ay rushing out of school, seeing the car before he sees
ther... The glove compartment, always filled; the gas
k, always empty—and the same wondrous creature re-
onsible for both... The big shopping center expedition
Saturday morning... And Saturday evening, the car
agically becomes a royal carriage. A gleam in his eye.
And hers. REDBOOK MAGAZINE salutes the product
that looms so large in the lives of our
Young Adults.
How fast do jets go?
It depends on who's pushing!
How to Tell a Young Adult
SHE'S MAD FOR POWER
Redbook

PROMOTIONWISE, T

Can photographers sell advertising space? The answer, it seems, is yes—because more and more magazines these days are relying heavily on photography in their presentations to top-flight advertising prospects.

Not so long ago advertising promotion departments depended almost exclusively on artists for visuals. Even the big picture magazines such as *Life* and *Look* tended to discard the camera when it came to promoting themselves to advertisers. If a picture was worth 10,000 words, a drawing was thought to be worth 20,000 at least.

Nowadays the situation is changed. The camera is being wielded as a potent promotional weapon—an instrument that sells advertising space.

I better tell you about this promotion field right off. It spends millions of dollars and a staggering quota of brain power to reach an audience that is less than one-third the size of Chillicothe, Ohio. Why? Because about 6,000 experts decide how to apportion some three billion advertising dollars annually. The trick is to persuade them to funnel some of that money into your magazine (or newspaper, or TV and radio station). It's a neat trick, indeed, because advertising space-buyers are the most promotionally pampered group that has emerged since the invention of papyrus.

Each day their desks are overrun with a parade of four-color propaganda, from pamphlets and pop-ups to just plain letters. In addition, they are subjected to a procession of presentations by space salesmen. There are card presentations, slide presentations, motion picture presentations, presentations that light up and talk, and presentations that are put together like blocks or erector sets. And every single presentation is urging the space-buyer to do just one thing: *buy*.

Quite understandably, the average space-buyer has emerged practically promotion-proof. And, just as understandably, the space-seller has grown continously more frenetic in his efforts to attract, astonish and eventually, to sell the advertiser.

Somewhere along the line the promotion man discovered the camera—and things haven't been the same since.

Here is a typical example. A few weeks ago a space salesman for *Redbook* magazine walked into a conference room of a big advertising agency on New York's famed Madison Avenue, and carefully set up his stack of prepared cards on an easel. The salesman was "pitching" for a large children's wear account. His job was to prove that *Redbook's* readers had a lot of young children and were therefore likely prospects for the children's wear manufacturer. But first, of course, the salesman had to break the ice.

He started to unveil the first card, then apparently thought better of it, and announced, "Before I begin this presentation, I thought you might get a kick out of these pictures." He took a billfold out of his pocket and passed it down the long conference table. The billfold contained candid shots of young children in typical "cute" poses.

Those ad executives were busy men. Though polite, they were obviously bored and irritated as they examined the snapshots and passed them

In the field of visual communications, no audience is more pampered with pictures than the six-thousand buyers of $3,000,000,000's worth of ad space every year. Here the former Promotion Director of Redbook Magazine, Richard J. Margolis, tells how the camera has invaded the high-stakes ad promotion game

THEY'RE CLICKING

along to the next man, down the long table.

Finally, the pictures went the circuit. The last man gave the pictures a cursory look and handed them back to the salesman. "Cute kids," he muttered. "Are they yours?"

"No," said the salesman with unmistakable relief. "They're *yours*." With that he revealed the top card of his presentation. It was a montage of children's shots—the same children as in the billfold—with the headline: OVER 2,000,000 REDBOOK CHILDREN . . . YOUR BEST PROSPECTS FOR 1960.

The admen laughed. They'd been tricked—and they loved it. The strain of those crucial opening minutes was nicely dispelled, and an important sales point had been painlessly put across—the central point, in fact, of the entire presentation.

As a sidelight, it's worth noting that the pictures in the billfold were mediocre—precisely the kind of ill-conceived photography you might expect to find in an amateur's wallet. The photographs in the montage, however, had to be technically perfect as well as dramatic—and they were.

The point here is that photographic standards in the promotion industry are often less important than pragmatic standards. The worth of a photograph is in strict proportion to his immediate usefulness. Take *Redbook's* annual automotive survey. Each year it is presented on cards or slides to Detroit's automotive moguls, giving them a detailed synopsis of who plans to buy which makes, and types of automobiles, and why.

Last year's presentation, designed for an overhead projector, added a section on small cars to the survey, a touchy subject in most automotive circles, but a crucial one, too. The problem was—finding a way to introduce the topic dramatically, yet not appearing too pushy about small cars on the American market.

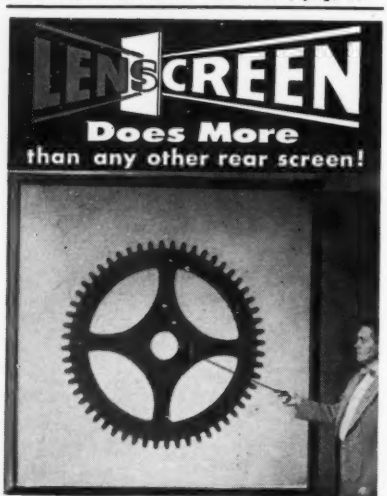
Since each section in the presentation was to be introduced by a photograph, our art director searched for a suitable small-car picture. He found an unlikely shot—a dramatic photograph of Chicago's Outer Drive, showing the skyline, the sweep of Lake Michigan and, quite incidentally, the speeding traffic. His sharp eye had caught something useful in the picture—one small car completely surrounded by standard-size American makes. It was the perfect shot for the presentation, because it emphasized the role of small cars in the total market, yet politely kept the larger cars very much in the picture.

Of course, if I wanted a picture for my living-room wall, I would be more inclined to choose that shot of the skyline and the lake. It is a "better" picture, but only a tiny section of it proved promotionally useful to us.

One of photography's chief appeals to promotion men is that it records what it sees rather than what it imagines, and can therefore lend authenticity to one's promotional claims. Photographs of store window displays and other merchandising material distributed by magazines are a case in point. It is usually important for a magazine to prove to an advertising prospect that stores everywhere are using (*continued on the following page*)

Make it an
inside job
with a
ColorTran GROVER
12x20 CONTACT PRINTER
One Compact Unit
★ makes stats
★ burns in plates
★ does color separation
★ prints metal plates
Controlled Even Light without diffusion – made possible with COLORTRAN'S built-in converter. Uses ordinary household lamps.
Priced at $565.00
Mfg. by
NATURAL LIGHTING CORP.
630 S. Flower St., Burbank, Calif.

Get more information. Circle 460, page 77



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You get both with Polacoat LENSCREEN rear-projection screens. Lensatic processed translucent panels provide deep contrasts, high resolution, full color fidelity. Choice of glass, plexiglas, or flexible types to suit all needs.

For training, sales presentations, exhibits, conference rooms, instrument read-out, photo-background use — there is a LENSCREEN screen ready to serve you.

Request Kit of Applications, advise us of your special needs.

POLACOAT INC. 9764 Conklin Road Blue Ash, Ohio

Get more information. Circle 469, page 77

PROMOTIONWISE

(*continued from page* 59)

signs that say: "As advertised in—Magazine"—or something similar. The pictures prove that the magazine's name packs some weight with retailers and customers. Many magazines sponsor picture contests among the retailers, with the best window-display shot earning a cash prize (sometimes as high as $500). But the entries are generally so poor that the magazine has to organize a group of stringer photographers across the nation who, when called upon, can photograph hundreds of retail displays in key cities.

But if photography were capable only of supplying this kind of ungarnished documentary evidence, it would be an overrated form of communication. Actually, photography's most appealing role in promotion work is to dramatize the message . . . to transform the media statistics into recognizably human terms. It is not unusual for the space-buyer to mentally choke on the steady, dry diet of numbers that salesmen keep feeding him. Photographs can be a great relief.

At *Redbook*, we have been using pictures to portray the special kind of audience it reaches. As you may know, *Redbook* calls itself the Magazine for Young Adults, appealing mainly to young families who live in the suburbs and who tend to lead a special, definable way of life. Three years ago we attempted (successfully, I think) to capture the unique flavor of this way of life in a 40-minute movie. The cast, like all those post-war Italian films—was taken from real life—Young Adults at parties, Young Adults in their backyard, Young Adults in shopping centers, etc. It was enormously effective, because it bore the human authenticity of unrehearsed, unposed living.

Delighted with the results, we began to use Young Adult shots in our direct mail pieces. But we chose stock photographs instead of getting originals. This mode reached its zenith when we sent out a series of 13 different success stories, each one a postcard with a different Young Adult photo.

But stock pictures weren't doing the job. So last year we hired a free lance photographer, Mort Schreiber, to take 3,000 pictures (all 35mm) of *one* Young Adult family. He was given no specific instructions, nor was anyone on hand to supervise his picture-taking. As a matter of fact, we didn't have the slightest notion at that time how we might use the pictures. We were hoping the photographs themselves would suggest their own utilization. Magazines, particularly *Life*, do this sort of thing editorially all the time, but as far as I know we were the first to apply the method to advertising promotion.

For subjects, we picked a young family in Huntington, Long Island, with two boys, ages 4 and 1. Naturally they were *Redbook* subscribers.

Schreiber plunged right in—visited them, dogged their footsteps, participated in their daily routine. He accompanied them on shopping expeditions, went to the beach with them, attended their parties; took pictures as they put the kids to bed, prepared the meals, brushed their teeth and mowed the lawn. Within the bounds of good taste, Schreiber managed to record most of the everyday happenings in the young family's routine.

He was careful not to "commercialize" the pictures. As we had told him, the girl didn't have to look beautiful and glamorous; the kids weren't supposed to be gleamingly scrubbed and in their Sunday best. We didn't care what products happened to get in the picture—just so there was a variety—or whether the girl wore the latest hairdo. Our advertising prospects had to believe in these pictures as honest reflections of *Redbook's* audience.

Schreiber was delighted. "I've never had so much freedom on an assignment before," he told me.

"Imagine getting paid for taking the kind of pictures that I *like* to take!"

Actually, the photographs had far more commercial value for us than any comparable batch of posed shots. *Redbook* has been using these photographs for six months now, in every conceivable kind of promotion piece. Both copywriters and artists count heavily on this packed picture file, which seems to contain an infinite variety of dramatically applicable situations. At least 50 presentations already contain photographs from this happy experiment. They describe *Redbook's* audience better than all the drawings, statistics and copy lines that have gone before them. Even the weary space-buyer is refreshed by these completely natural (including the lighting) pictures of an unpretentious but appealing young American family.

Perhaps what this experiment proves is that there can be practical value in taking photographs with no particular assignment in mind, just for the sheer pleasure of making a clear and honest statement about the subject. If you keep taking pictures and filing them away, many of them will doubtless turn out to be applicable to alter assignments.

At the opposite end of the poll from the Schreiber exploit is the highly detailed assignment that often ties a photographer hand-and-foot, creatively speaking, but is likely nevertheless to call forth his greatest technical skills. In this situation, the promotion man puts himself entirely in the hands of the photographer, and hopes for the best.

Quite often the situation arises because the promotion man or the salesman has some devilish whim about the presentation, some preconceived notion of how the thing should look. And he tries to get the photographer to translate these vague visual yearnings into something clear and compelling.

I can recall one slide presentation aimed at "baking" advertisers such as Pillsbury and General Mills, in which the salesman wanted to depict variously shaped mounds of cake flour amid the welter of statistics. "It'll brighten the whole thing up," he assured me. Resigned but hardly reassured, I gave the assignment to a studio and waited for the worst.

Instead, we got the best — a series of beautiful high-key photographs of flour mounds, worked in with astonishing adeptness among the charts and tables.

The salesman took one look at it and said, "That's just what I meant," and I believe it was. Somehow the man at Presentation Designers had managed correctly to translate this fuzzy assignment into high-key quality.

I am not a photographer, but I suspect that this knack of understanding a layman's photographic desires is a good camerman's stock-in-trade. It requires something like an intuitive sense of what the client or the boss *really* wants. When a word-man talks to a picture man, there is likely to be a complete collapse in communications. The only real solution is a return to Chinese ideographs.

In the promotion industry some of the requests can be rather weird. There was that announcement *Redbook* made last year about the opening of an advertising office in Los Angeles. The announcement contained just seven words: REDBOOK IS NOW ON THE WEST COAST. No trouble, really—except that the words were to be written in sand on an ocean beach, with the foamy surf lapping up close-by. Unfortunately for the photographer, he got the assignment in the dead of winter. So—he trekked out to a deserted Jones Beach one cold Long Island day to take a picture.

First he had to carve the words in the sand with a big stick, picking a spot near the edge of the tide water. No authority on Atlantic tides, our shivering photographer twice watched his painfully hewn words get washed away. Finally,

(*continued on page* 62)

FOR THOSE WHO DEMAND THE FINEST in

COLOR

and

BLACK & WHITE

- Complete **BLACK & WHITE** 16-35 mm film processing.
- Complete **EASTMAN COLOR** 16 - 35 mm negative — positive processing.
- **COLOR FILM STRIP PRINTING & DEVELOPING.**
- **KODACHROME ADDITIVE** scene to scene printing.
- **EKTACHROME** developing.

in the East it's . . .

MOVIELAB

MOVIELAB BUILDING
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JUdson 6-0367

Get more information. Circle 456, page 77

PROMOTIONWISE

(*continued from page* 61)

half frozen by the salt wind, he got it right and managed to hold steady long enough to take the picture he needed.

It was great. We used it as a direct mail piece and also in various presentations to West Coast accounts. The piece won an award from the American Institute of Graphic Arts, and has been part of AIGA's touring exhibition for the past year. The citation was helpful in thawing out the photographer.

While not all promotional photography is quite so heroic, some of it can be still more complicated —or, to use a word of the trade, gimmicky. I have noticed that presentations produced for inside sales meetings tend to be a good deal wilder than presentations directed at outsiders. And they are likely to be more fun.

At one *Redbook* sales meeting the Drug Products sales manager, discussing advertising prospects for the coming year, used a huge Kleenex-like box—5 ft. long and 3 ft. wide—for his presentation. The squares of cloth he kept pulling out of it had been hand-lettered, and he was able to drape them from a couple of hooks above the box. Just for a change of pace, some of the squares were blank—the signal to turn on the projector and show slides, using the blank cloth as a screen.

The reason presentations for outsiders tend to be less tricky is that the salesman is less sure of his ground. Not only is it difficult to gauge—the reaction of a prospect, but sometimes it is impossible to predict where the presentation is going to be held and what the physical limitations will be. In this hectic business, where appointments are made (and cancelled) at an astonishing clip, it is possible for the salesman to get caught off balance. I have seen them walk into a prospect's 20-sq. ft. cubby hole armed with a slide presentation and projector designed for an auditorium. A few years ago a filmstrip presentation that I wrote for the late lamented *Collier's* magazine fell with a sickening thud when it was shown in a beautiful conference room with windows on three sides—and no blinds or shades.

The photographer assigned to a presentation can often be helpful by reminding the salesman of these many variables and helping to design a presentation that is, by and large, variable-proof. A few photographers I have worked with go much further than that and attempt to design a presentation that "fits" the salesman's personality. This, of course, can be crashingly unsuccessful if the photographer or promotion writer guesses wrong about the salesman.

However, as advertising promotion and photography team up more and more frequently, it's becoming clear that something more than technical and creative skill is expected of the photographer. That is—tact, patience and an understanding of the people and goals involved.—THE END

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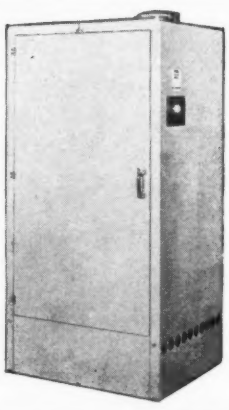
OR COLOR FILM AND PRINTS
the PRACTICAL WAY!

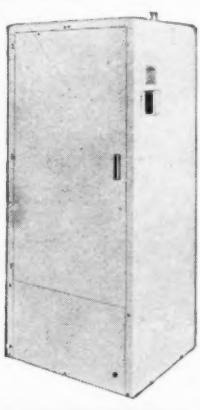
Remove film drying bottlenecks, cut drying time with a modern, economical Pako Model 2 or 2D Drycab. Each occupies less than 6 sq. ft. of floor space, yet holds up to 50 rolls of amateur film, 60 rolls color film, 100—5 x 7 or 4 x 5 films or 50—8 x 10's.

Model 2 Drycab



Forced, warm, filtered air, thermostatically controlled, circulates through the drying cabinet giving fast, safe, uniform drying. For roll film, cut film, and film packs of black and white film or color film and prints. Average drying time 45 min. Through-the-wall installation available for added efficiency.

Model 2D Drycab



Fast film drying using less heat, with the new self-contained dehydration unit. Consistent uniform drying year around. Moisture is removed by refrigeration. No vent required. For Black and White Film, ideal for Color Films and Prints. Drying time B/W 10 to 15 minutes; Color 20 to 25 minutes.

PAKO

PAKO CORPORATION
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PAKO FOR PROGRESS

Get more information. Circle 466, page 77

GRAPHIC ARTS

(*continued from page 26*)

standard development, the inherent gamma of an emulsion is influenced by the wavelength of the light initiating the photochemical effect. Generally speaking, gamma is lowest for blue light and increases for green, yellow and red. Thus, when changing from one light source to another, a possible adjustment in developing time must be anticipated because of different spectral response.

Intermittent vs. non-intermittent

It is well known a series of intermittent exposures do not equal one non-intermittent exposure even though the illumination level is constant and the product of Intensity times Time is the same in both cases. Electrically operated light sources, of course, fluctuate in accordance with the power line frequency. The light produced is therefore not continuous but alternates a given number of times per second (according to line frequency) between minimum and maximum output. This is especially true of the discharge sources. The intermittency factor may be experienced in repetitive flash exposures and with some pulsating discharge sources. In the case of incandescent sources the glowing metal (filament lamps), or the glowing gases (carbon arcs) provide some light during the period of extinction and for all practical purposes can be considered to have a continuous output. To a certain degree this also applies to fluorescent sources because of the afterglow of the phosphors.

From this brief review it is obvious that light sources differ widely in spectral distribution, operating characteristics, intensity and other qualities. It follows, therefore, that they can not necessarily be used interchangeably or expected to produce equal results. Comparative data on the behavior characteristics of light and emulsion combinations are sadly lacking. The photographer has no recourse but to make practical tests. But in making such tests all of the variables should be understood and anticipated. Tests should cover a wide range of exposure levels and the results should be read and plotted. When evaluating a new light source the tests should always be made with several emulsions rather than just one. This will avoid condemning a light because of some limitation of the emulsion and, who knows, may lead to the discovery of a new combination of light, emulsion and exposure technique that provides superior results.—THE END

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Durable and lightweight, the "27" can easily be carried from one department to another for most convenient operation.

Because of its versatility, the "27" combines three machines in one — a Monobath (Many-Copy) processor, a diffusion transfer processor, and a stabilization processor.

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New discovery! Apply a few drops to scratched negative—place in enlarger—make print and *presto!* Not a scratch in sight! ½ ounce, $.89—4 ounces, $3.95.

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Get more information. Circle 426, page 77

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PORCELAIN ENAMELED STEEL

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COLUMBIAN ENAMELING & STAMPING CO. Inc., • Terre Haute, Ind.

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WHEN *Motion* IS NOT ESSENTIAL...

Nothing is more effective than an organized slide presentation!

Colburn Custom Services...

Integration of your original miscellaneous transparencies, photographs and artwork, into an effective, easy-to-manage presentation

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- **Sound recording**
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Get more information. Circle 420, page 77

CAMART DUAL SOUND EDITOR

Model SB-111

Complete with optical sound reproduction head (or choice of magnetic soundhead) base plate, amplifier-speaker. For single or double system sound. An unbeatable combination with Zeiss Moviscop 16mm precision viewer, sharp brilliant 2¼ x 3¼ picture.

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PLaza 7-6977

Zeiss Moviscop Viewer $89.50
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Color Film Strips

fast and economically

. . . from 35mm slides, transparencies or artwork. Also black and white film strips.

•

Fast service on 35mm color duplicate slides.

•

DuKane audio-visual equipment.

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Use FilMagic All Ways!

—FilMagic Cloths Hand-Clean Films, Records.
—FilMagic Tapes For Film Cleaning Machines.
—FilMagic Pylon Kits For Tape Recorders.
—FilMagic Pylon Kits for 16MM SOF PROJECTORS.
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COST ACCOUNTING

(*continued from page 45*)

ple. Generally, the larger the company, the greater the number and complexity of the forms.

The importance of cost recovery will vary with the type of operation. In some companies the photo section is a luxury. Perhaps half its effort is devoted to personal work for management. In this case, cost accounting will just tell them how much this particular luxury costs.

Similarly, if there is no alternative service, less emphasis is placed on cost control. At a recent meeting, photographers were swapping tales of woe about how hard it was to get money for salaries, new equipment, salaries, more space, salaries, etc. One man sat back, slightly bewildered. He said he did not have any trouble with his management. He forgot to add that his was the only photo operation at a top secret missile range a thousand miles from nowhere.

Prices must be competitive

In most cases, however, plant prices have to be fairly close to competitive prices. Some section heads suggest using outside prices as targets and adjust plant prices accordingly. Care must be taken to insure that the price and quality are really competitive. Neither a mass production 8 x 10 glossy print factory nor a luxury portrait studio is competitive with the average in-plant department.

In other departments charges are set to cover costs, the trick being to avoid too great a profit or loss. It takes a fair amount of skill to project cost figures a year ahead, but it can be done.

The temptation to set prices high so as to show a profit at the end of a fiscal year is offset by the knowledge that photo sections have been known to price themselves out of the market and out of a job. Sometimes costs increase without the department head being aware that his service is no longer competitive. Proper cost accounting can serve as a check to insure that the photo department is not becoming an expensive luxury. While all management appreciates the need for photographic service, it still wants its money's worth.

It is easy to blame management for being stingy but imagine that you as section leader are paying for the photo department. Would *you* be getting your money's worth? In the answer lies your photographic future.—THE END

METHODS FOR TOMORROW

(*continued from page 35*)

shows the unit exposure values, which form a $\log_2$ series, and any combination of f/number (when squared) and shutter speed suitably designated, whose $\log_2$ values add up to the same number will give equivalent exposure to a film. Now to explain why this should be.

The exposure values are derived from the relationship A^2/T, where A is the f/number and T is time in seconds, and where A^2 and 1/T are given on a $\log_2$ basis. Perhaps a brief review of logarithms is in order before we go any further.

TABLE I

POWER SERIES	CORRESPONDING LOG SERIES TO THE BASE TWO
$2^0=1$	$\log_2 1 = 0$
$2^1=2$	$\log_2 2 = 1$
$2^2=4$	$\log_2 4 = 2$
$2^3=8$	$\log_2 8 = 3$
$2^4=16$	$\log_2 16 = 4$
$2^5=32$	$\log_2 32 = 5$
$2^6=64$	$\log_2 64 = 6$
$2^7=128$	$\log_2 128 = 7$
$2^8=256$	$\log_2 256 = 8$
$2^9=512$	$\log_2 512 = 9$
$2^{10}=1024$	$\log_2 1024 = 10$
$2^{11}=2048$	$\log_2 2048 = 11$

Logarithms are exponents or powers to which a given number, called the base, is raised. For example, in the equation $10^2=100$, 2 is the logarithm of 100 to the base 10. In the same way, 3 is found to be the logarithm of 1000 to the base 10 because $10^3=1000$. Now logarithms make many types of calculation rather simple because they can be added to get a result. Consider $10^2 \times 10^3$. The product is equal to 100 times 1000, or 100,000. But 10^5 (10 multiplied by itself five times) is also equal to 100,000. Thus, it is obvious that $10^2 \times 10^3 = 10^{2+3}=10^5$, showing that exponents (logarithms) can be added.

But logarithms are not restricted to powers of ten. The general equation $A^x=n$ expresses the versatility of the logarithmic system. In this equation "x" is the logarithm of "n" to the base "A." Thus, when we speak of logarithms to the base two we are referring simply to exponents or powers of two. Table I will make this clear.

Going back now to the exposure value system we can see where log-

(*continued on page 70*)

Never Before
Such All 'Round Performance
From ONE Camera...
• MAKES XEROX® MASTERS TAKES COPY ART TO 24" x 24"!
• MAKES OFFSET NEGATIVES TO 17" x 17"!
• MAKES COPY PRINT NEGATIVES . . . TO 17" x 17"!
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• MAKES SILK SCREEN NEGATIVES!
A model for every recording need! Prices from $975.00
Princeton
COPYING, ENLARGING and REDUCING CAMERA
It's superb! Self contained! Unlimited Range . . . Interchangeable Lenses and Backs . . . Front or Rear Lighting . . . Independent Controls . . . Effortless Image Focusing! Fully Guaranteed! In Use by Professional & Gov't. Agencies.
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PERSPECTIVE

QUARTERLY REVIEW OF PROGRESS IN PHOTOGRAPHY, CINEMATOGRAPHY, SOUND & IMAGE RECORDING.

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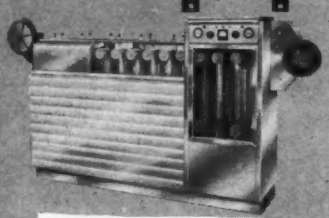

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Send for free Brochure #400
Get more information. Circle 404, page 77

by Ernest E. Reshovsky

PHOTO INSTRUMENTATION

A minicam that goes up in space to shoot the moon's other face

At the Jet Propulsion Laboratory (JPL) of the California Institute of Technology, Pasadena, a compact, lightweight 35mm camera is waiting for a ride. Intended for planetary photography, the Camera-Developer-Scanner (CDS for short) will travel in a high altitude research rocket. Since the moon is the nearest celestial object, it conceivably might be the first subject of this camera, which weighs but 3.3 lbs. and measures 8 in. in diameter.

(The payload of the Russian rocket which photographed the far side of the moon was about 600 lbs.)

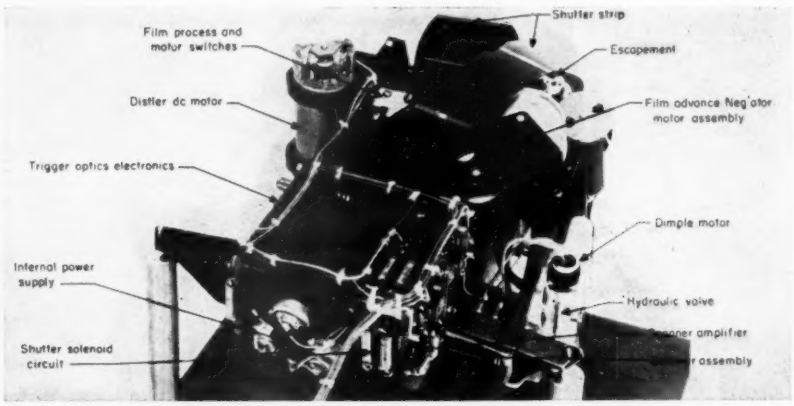
Responsible for the design and production of the CDS is a team of four men: Jerry Stuart, project research engineer; Jack Miller, design engineer; Lou Fillmore, instrumentation specialist; Misashi Fujimoto, electronic technician.

CDS will carry a foot of Tri-X 35mm film in a radiation-shielded cassette. It will take ten exposures, an inch square. These pictures are then to be developed, fixed and scanned, being transmitted back to a ground receiver where the electric signal is converted back to a photographic image.

The camera is equipped with a 180mm f/5.5 Tele-Xenar from which the diaphragm has been removed. A Mylar polyester focal plane shutter has ten slits, each 1/10 in. wide. This makes possible successive exposures without the need for rewinding. The actual exposure time of each frame is 1 millisecond.

Since the payload package containing the CDS will be spinning at about 6 rpm at arrival on target, provision had to be made for exposing pictures only when the camera's lens is pointed squarely at the subject. This job is done by a secondary optical system, lined up alongside the camera lens. Included in the secondary system are two photo diodes which must be properly aligned with a subject in order for an exposure to be made, one frame at a time. Thus, pictures are made only when the camera is correctly aligned with its target, one exposure per revolution until the full roll is exposed.

The spin motion is parallel to the film transport, so that the film strip which travels at a rate of one inch per second during exposure offsets the blur which might otherwise appear. While the camera spins, the film travels, the relative image appearing



The complete CDS unit fits into a space 8 in. in diameter. Film is exposed, processed and scanned for transmission to ground in a 10-hour cycle. Camera uses a foot of 35mm Tri-X exposed at E.I. 800 and developed in double strength DK-50.

stationary during the exposure. Film and shutter are advanced mechanically by means of a spring drive.

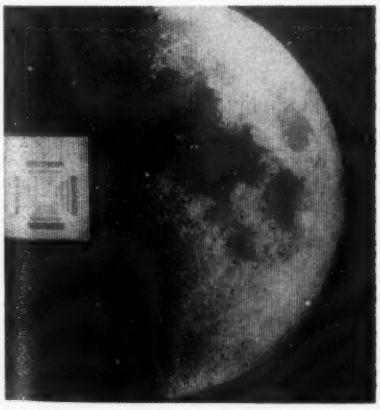
Every missile its own darkroom

At the completion of the last picture, a contact on the focal plane shutter actuates the processing-scanning cycle. Film direction is reversed and the filmstrip pulled back at one inch per hour. This relatively slow speed was chosen to conserve valuable electric current while the satellite is traveling. As Jerry Stuart remarked, "it's a long way back and once the pictures have been taken, we have plenty of time."

First the film passes a rubber tube which wipes liquid developer (double strength DK-50) on the emulsion. After seven minutes of development, another rubber tube supplies fixer. In 14 minutes, the film is fully processed to an estimated exposure index of 800.

After processing, the film passes the scanning device, a closed loop system whereby the scanner diode adjusts the intensity of the spot light source continuously in accordance ten frames.

Until now, the Camera-Development-Scanner has not been tested in actual flight, the missile program be- with negative density. The scanning light spot is 1/1000 in. in diameter and takes 20 sec. to scan a frame. The resulting output is then telemetered to ground by the satellite's transmitters. It takes a minimum of 10 hours for the complete exposure-processing-televising cycle to complete the ing what it is. However, a test was made of its picture-taking ability. An astronomical photograph of the mood was used as the subject. CDS photographed, processed and transmitted the picture. The result is shown below.—THE END



Picture-making test of CDS used a photo of moon as subject. As of this writing, unit has not been used in flight.

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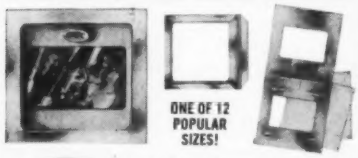

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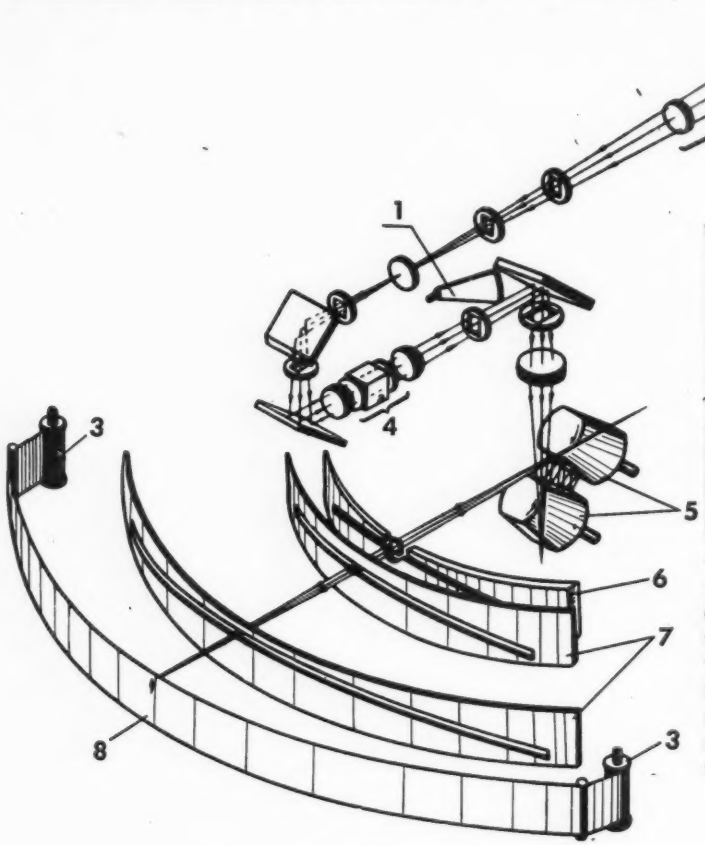
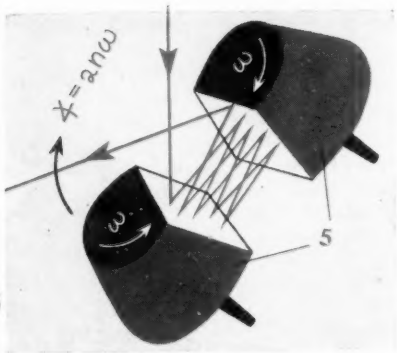
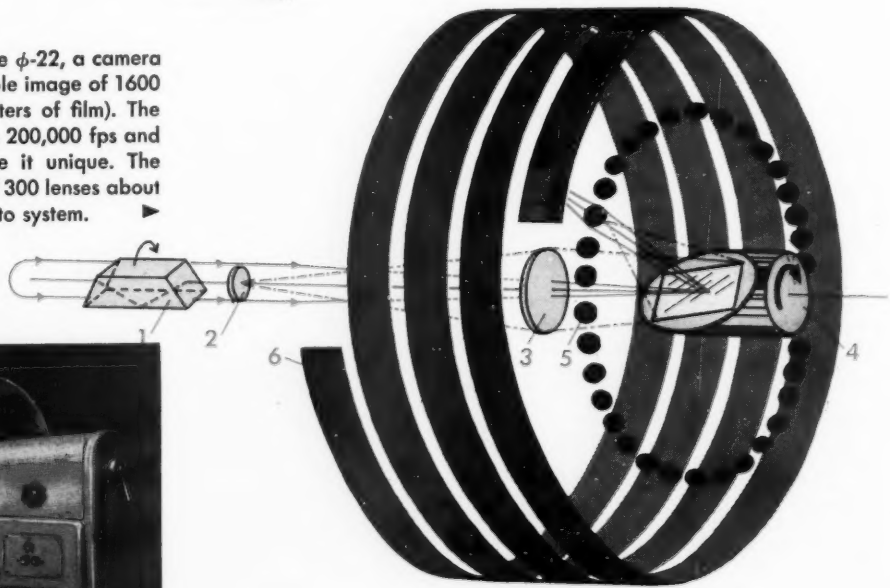
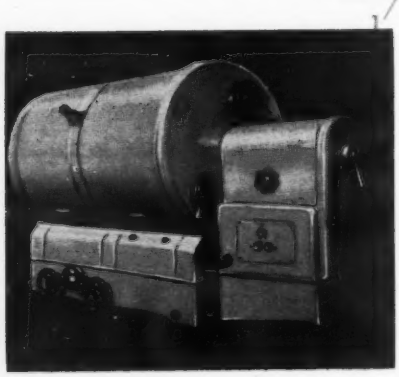




◄ **Figure I,** a reproduction of a Russian drawing, shows details of a 33-1/3 million fps camera that broke through a hitherto "theoretically limiting framing rate." Basic to the system is the double rotating mirror *(shown in enlarged detail).* Each successive reflection doubles velocity of the light lever.

Figure II, represents the ϕ-22, a camera that exposes a projectable image of 1600 8mm frames (on 30 meters of film). The camera's speed of up to 200,000 fps and length of the run make it unique. The moving helix and ring of 300 lenses about rotating mirror are key to system. ►





H SPEED PHOTOGRAPHY

How does an American expert rate Russian high-speed photography?

U.S. Army's Morton Sultanoff thinks it "new, original, imaginative".

Some very interesting and advanced equipment for obtaining photographic exposures at rates of 100,000 pictures per second and higher was exhibited in the Russian Pavilion at the Brussels World's Fair and at the Russian Exposition at the Coliseum in New York in August of last year. The work of the Russian scientists in this field was further exemplified by several papers presented at the 4th International Symposium on High-Speed Photography in Köln, Germany in October, 1958. Dr. Tchernyi—the Russian scientist who represented the high-speed photographic phase of the Soviet endeavors in scientific instrumentation at the exhibits and symposia—described and demonstrated much of this equipment, and the following evaluation is based on both personal observations and Dr. Tchernyi's descriptions and demonstrations.

I would select, as a single outstanding Russian contribution in the field of ultra high-speed photographic instrumentation, a Russian camera which has been operated up to 33 1/3 million frames per second. Although the basic optical-mechanical system, i.e., that of "reimaging" on the film by a second lens, the image formed in the plane of a rotating mirror by a first lens, is not new. (In this country it has been developed and used notably by Dr. C. D. Miller and Dr. Ira S. Bowen before World War II, and somewhat later by Beryl Brixmer and Thomas Holland at Los Alamos. It is presently being manufactured commercially by Beckman and Whitley in San Carlos, Calif.). The Russian innovation of twin rotating mirrors with successive reflections, in which each reflection doubles the angular velocity of the optical lever, as shown in *Fig. I*, an advancement of the basic system and constitutes a major Russian breakthrough of the heretofore "theoretical limiting framing rate" with this system. The single serious limitation of this system is the tremendous loss of light. The results on exhibition were direct exposures of light sources building up to full intensity (a standard gas discharge flashtube and an arc source).

A natural shortcoming of the standard "reimaging" camera is the limit of the total number of frames, determined by the physical dimensions of the lenses required to produce this number of frames around a single circumferential arc. The Russian ØП-22 camera uses a single ring of about 300 lenses which would normally limit the total run to that number of pictures. However, the film is wrapped in a helix as shown in *Fig. II*. The mirror (4) in this illustration is arranged to rotate around a longitudinal axis at an angle to its face. As the image formed by lenses (2) and (3) in the plane of the mirror is reimaged on the film plane by the ring of lenses (5), one at a time, the film is physically transported longitudinally, along the axis of mirror rotation. Mechanically this translation is accomplished by the use of an engaging pin which drops into a helical slot cut along the main rotational shaft. This helix drive has a graduated "accelerating" pitch with a constant high pitch section for exposure and a graduated "decelerating" pitch. This system produces 1600 8mm frames on 30 meters of film. Rotation of the separate images with respect to each other, which would result from the angular rotation of the mirror with respect to its own face, is compensated for by the rotating prism (1) shown in the sketch. The filmstrip from this camera can be projected directly as a motion picture, and the camera is capable of 5,000 to 200,000 frames per second.

Two other Russian techniques, which will be described more completely in the forthcoming proceedings of the 4th International Symposium on High-Speed Photography, which are worthy of note here, are the methods of production of a "lenticular" plate and a multi-flash submicrosecond X-ray technique.

Heretofore, lenticular plates for use in the Courtney-Pratt high-speed camera system now being marketed by the British firm of Hathaway, Ltd. consisted of a crossed pair of cylindrical lenticules, the supply source for which has been limited and unsatisfactory. The Russians produced plates of ideal, spherical lenticules by a mechanical-photo process based on the tendency of gelatine emulsion to swell and dissolve systematically as a function of hardness, exposure and pre-treatment.

The X-ray technique described by the Russians consisted of arranging eight sub-microsecond X-ray tubes around a lead plate of square configuration so that, as each tube is flashed, a central hole in the plate permits successive images to fall on a single X-ray film at independent positions on the film (much as the Cranz-Schardin optical technique operates with a single collector lens and multiple positioned individual spark sources).

The Russian exhibitions also included a typical "smear" camera embodying the principles known and used widely, since Mach, for obtaining quantitative data. However this camera was novel in that, with an accessory set of optics, it could also be operated as a standard framing reimaging camera. The conversion actually consisted of using the single rotating mirror system as a multi-purpose camera by removing one set of optics and inserting the other so that the mirror, its drive system, first lens, and film holding and positioning device could be used alternately as a smear or imaging camera.

Many comments have been made pro and con about the value, quality, degree of advancement and accomplishments of the Russians in the field of ultra high-speed photography but one fact seems indisputable—they do represent a degree of original thinking.—THE END

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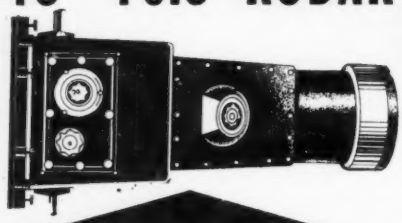

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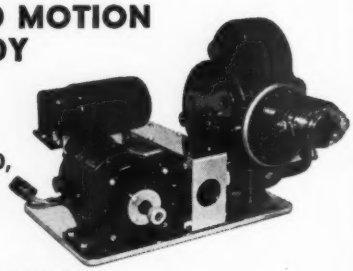

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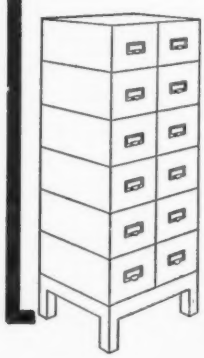

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METHODS FOR TOMORROW

(*continued from page 65*)

arithms to the base two fit in. The ratio A^2/T written in terms of such logarithms is $\log_2 A^2 - \log_2 T$. (When numbers are to be multipled their log values are added, but when the numbers are to be divided, their log values are subtracted.) But in the ratio A^2/T the reciprocal of T, that is 1/T, is implied, because A^2 x 1/T equals A^2/T. Therefore, the log expression can be written $\log_2 A^2$ plus $\log_2 1/T$.

TABLE II

f-no.*	f-no.^{2}	T=sec.	$\frac{1}{T}$	**$\log_2 \frac{1}{T}$
1	1	1	1	0
1.4	2	1/2	2	1
2	4	1/8	4	2
2.8	8	1/4	8	3
4	16	1/15	15	4
5.6	32	1/30	30	5
8	64	1/60	64	6
11	128	1/125	125	7
16	256	1/250	250	8
22	512	1/500	500	9
32	1024	1/1000	1000	10
45	2048	1/2000	2000	11

* Numbers in the f-no. squared column are approximated to form a uniform series.

** $\log_2 \frac{1}{T}$ also represents the $\log_2$ of the f-no. squared.

We can now prepare a table to show how the additive feature of the exposure value system operates. *(See table II above)*

Suppose that for a given film and illumination correct exposure calls for 1/30 sec. and f/5.6, but that we want to use a faster exposure time. It is not necessary to make any complicated calculations if we refer to the fifth column of Table II, remembering that $\log_2 A^2 + \log_2 1/T$ applies. The $\log_2$ value for 30 (1/30 sec.) and the square of 5.6 is the same, i.e., 5. The sum is therefore 10. Accordingly, any combination of f/numbers and exposure times whose corresponding $\log_2$ values in Table II add up to 10 can be used, for example, f/1.4 and 1/500 sec.

ASA compliance with EVS

The factors that determine correct exposure include more than the f/number and exposure time. We must also consider the film speed and the scene brightness (luminance) in a complete system. Since it appears as though the exposure val-

ue system is the trend of the future, the ASA subcommittee chose a log-to-the-base-two scale for the new logarithmic scale of speed values. Then if brightness values are expressed on the same basis, all four exposure factors can be welded into a neat system in which only simple addition of unit values ($\log_2$ values) is necessary for exposure determination under various circumstances. However, in order to bring scene brightness values and the new ASA speeds into line it is necessary to apply constants, but this is a straightforward procedure which introduces no difficulties.

The system that has been proposed is called the Unit Value System (UVS). The four factors involved are designated as A_v, T_v, S_v and L_v, referring to lens aperture value, time value, speed value and light value. All of these values are based on a $\log_2$ scale and therefore can be handled by addition. In fact, the complete exposure value equation is, $A_v+T_v=S_v+L_v$. Therefore, film speed and scene luminance can be juggled around by the same procedure already outlined for f/numbers and exposure times. The unit values for various film speeds and light levels, along with the unit values for lens apertures and exposure times, are given in the first column of Table III.

For every f/number from f/1 to f/45, every exposure time from 1 to 1/2000 sec., every film speed from ASA 3 to 6400 and every light value from 6 to 12,500 ft. candles there is a corresponding unit value. Adding all four unit values together yields a given sum. Any changes in the lens aperture, exposure time, film speed and light level must be such that the same sum of unit values always results if an equivalent exposure is desired. In other words, the photographer can find the exposure required with any film and light level literally as simply as adding 2+2.

For the technically minded

The unit values A_v, T_v, S_v and L_v are derived in the following manner.

The general exposure equation is $A^2/T=LS/k_1k_2$ where A^2 and T are the same as previously defined, L is the light level in ft. candles, S is the new ASA proposed speed and k_1 and k_2 are constants applied to L and S.

Taking the log of both sides of the equation (to the base 2) we get:

$$\text{Log}_2A^2+\log_2\frac{1}{T}=\log_2\frac{L}{K_1}+\log_2\frac{S}{K_2}$$

It is apparent from Table III that k_1 and k_2 must be 6 and 3, respectively. Consider any one of the unit values in column 1, for example, 4. This means that all of the values in the table corresponding to unit value 4 must be 16 in the above equation because $\text{Log}_216=4$. Speed 50 divided by 3 is roughly 16 and light level 100 divided by 6 is roughly 16.

For further information on aperture markings and exposure-time markings for still cameras that comply with the unit value system, refer to the recently published ASA Standards, PH3.33-1959 and PH3.32-1959.

TABLE III **UNIT VALUE SYSTEM (U.V.S.)**

U.V.S. UNIT VALUE	A APERTURE (F/NO.)	T TIME (SEC)	S SPEED (ASA)	L LIGHT (FT-C)	LIGHT (DESCRIPTIVE)
0	1	1	3	6	Average home interior
1	1.4	1/4	12	25	Bright home interior
2	2	1/8	25	50	Work areas interior
3	2.8	1/2	6	12	Sports arenas interior
4	4	1/15	50	100	Studio—Photoflood
5	5.6	1/30	100	200	Sunsets
6	8	1/60	200	400	Rainy day
7	11	1/125	400	800	Open shade
8	16	1/250	800	1600	Medium overcast
9	22	1/500	1600	3200	Light overcast
10	32	1/1000	3200	6400	Sunlight—normal scene
11	45	1/2000	6400	12500	Sunlight—bright scene

For correect exposure: $A_v + T_v = S_v + L_v$ = Exposure Value
where A_v, T_v, S_v, and L_v are the unit values for A, T, S, and L

New U.V.S. system for exposure calculation is outlined in table form above. Because it is based on the logarithms of the values involved, the right exposure can be calculated by adding and subtracting small whole numbers.

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CAPITOL RECORDS

(*continued from page 43*)

voice is recorded by Capitol engineers. Presentation must be non-automatic because Capitol engineers would prefer slicing off toes to cutting out the frequencies used to advance the frames in automatic machines. For the originals, the camera is a 35mm and the film Kodachrome. Outside suppliers get a set of slides and make up the strips which circulate district sales offices.

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The motion picture project was made for a pow-wow of international Capitol affiliates (all, including Capitol, are owned by England's Electric and Musical Industries, Ltd.) in Paris. With narration by Tennessee Ernie, a Capitol star, and appearances by Sinatra and Ray Anthony it was done on a production budget of about $10,000.

The film was Commercial Ektachrome Negative. An editor with considerable experience in TV drama, Murray De'Atley, was engaged for the editing, ended up helping out with much of the camera work while the photo staff was bound up with their regular work. Besides the executive conference for which it was intended, the film has been seen on British Broadcasting Co. TV, vocational guidance sessions in public schools (there are jobs described that kids have never heard of), sales meetings and organizational meetings. It's an industrial film with a nice sense of humor, and neatly done. This Capitol Record's photo staff likes.—THE END.

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PROTEIN MOLECULE

(*continued from page* 51)

rected through the cylindrical lens which contains a slit to pass the light. The entrance slit of this model is .004 in. wide by ⅝ in. long; the exit slit is .0125 in. wide by .75 in. long and is mounted at a 20° diagonal.

The system uses a sealed schlieren cell. Image size is approximately 1:1.

The Tiselius cell holding the solution is immersed in water at 1° centigrade ± 1/100°; narrow tolerance is because temperature will affect the molecular movement of the solution.

In making the analysis, the solution (protein and buffer) is placed in the apparatus and observed on the screen. A Polaroid back, mounted on the end opposite the light source, permits the use of transparency film to check image or exposure. When the boundaries are at the desired point, Dr. Gross inserts a sheet film holder under the viewing screen at the top and makes the exposure. During exposure, the current is turned off to keep the boundaries from moving. At least two exposures must be made to determine movement from interval to interval. The range of exposure times is 20-40 seconds.

The desired picture has good contrast and maximum resolution of the fringe pattern and the dn/dh lines. Among the films which give these results are Kodak Process Pan, which is used most often, and Panatomic-X. Both materials are developed in D-11 for five minutes.

The electron microscope used by Dr. Gross is at Marine Biological Laboratory, Woods Hole, Mass. This instrument uses a stream of electrons directed through a subject to a sensitized plate below.

The chief advantage of the electron microscope is not its high magnification but the high resolution at comparable magnifications over an optical light system. Basically, the reason lies in the short wave length of electrons compared to light waves; the latter are 4-7000 angstroms; the former, one angstrom. (An angstrom is equal to 1/100,000,000 of a centimeter.)

Resolution is a function of wave length; the shorter the wave length, the higher the resolving power.

Specimens for electron microscopy are sliced into sections, the maximum thickness of which is 1000 angstroms. Actually, many specimens are less than half this thickness. A "stain" is used, osmium tetroxide (O_sO_4) or similar material with a heavy nucleus. The heavy nucleus scatters electrons from the stained portions which do not reach the screen. Unscattered electrons pass through to the screen from the unstained parts. It is this electron stream which provides the image.

In electron photomicroscopy, the photograph is often better than the image seen on the screen, due to defects and grain in the screen.

Kodak Lantern Slide Plates, contrast grade, 2 in. x 10 in., are used. These are developed in either D-76 or D-11. The first is used when it is desirable to avoid blocking highlights. D-11 is used for extreme contrast. The plates are developed by inspection immediately after exposure.

The third instrument is a Spinco Model "E" ultracentrifuge. This machine literally pulls a solution apart, creating forces up to 400,000 times gravity as its rotor spins up to 50,000 rpm.

The protein solution is placed in the cell of the rotor. Light passes from the bottom of the instrument through the sector-shaped cell and through a lens. The image is then deflected 90° by a mirror, reaching the film holder.

The picture is recorded as a series of peaks, marking the degree of separation of the components of a solution. One peak is recorded for each molecular species; if there is only one species, the picture shows only one peak per frame. The interval between exposures is set automatically and and the machine makes the actual exposure. In a series, the highest peak is at the beginning of centrifugation, the lowest at the completion of the process.

Dr. Gross characterizes his technique as the result of much trial and error. "You take standard materials used according to instructions found in manufacturer's manuals and adapt them for your own uses. It is impossible to lay down any rules or techniques to follow."

As an example, he cited his work in electron photomicroscopy where he worked for a year with an experienced photomicroscopist before beginning work on his own. "Good results, which from my point of view means usable data, depends as much on experience as on technical details."

Sheet film, processed in D-11 or

(*continued on page* 82)

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CAMERA & LENS

PANORAMIC AERIAL CAMERA 207
Perkin-Elmer Corp. 8-page brochure describes the Perkin-Elmer aerial 180° panoramic camera for wide-angle photography. Includes specifications.

MEDICAL PHOTOS 208
Exakta Camera Co. 2-page reprint from *Ohio State Medical Journal* entitled "Office Photography for the Practitioner."

16 AND 35MM APOCHROMATS 209
Karl Heitz Inc. Price sheet lists new reduced prices of over 65 Kinoptik Apochromat lenses in "C," Arriflex and barrel mounts for 16 and 35mm cameras. List also includes viewfinders, filters and other accessories.

MINIATURE 16MM 210
Traid Corp. Product profile sheet describes the Fotopak/15 miniature 16mm camera designed for missiles and crowded aircraft cockpits. Includes price and specifications.

DYNAFLEX CAMERA 205
Beckman & Whitley Inc. Specification sheet describes the Dynafax continuous writing framing camera for instrumentation applications. Camera has framing rate to 25,600 pictures per sec.

SCOPUS CATALOG 206
Scopus, Inc. Catalog includes information on Canon cameras, lenses, etc. and Olympus cameras, Spectra exposures meters and others.

HI-SPEED CAMERA 211
Camera Equipment Co. Three specification sheets with prices for the new Waddell high-speed motion picture camera for instrumentation purposes. Cameras are available in several speed ranges.

AUDIO-VISUAL

SELECTROSLIDE PROJECTORS 201
Spindler and Sauppe. Catalog sheets for the line of Selectroslide projectors for automatic projection.

VISULITE 202
Tecnifax Corp. Illustrated brochure describes the portable illuminated transparency viewer with a 13 3/4 x 18¼-in. screen housed in a luggage case. Includes price.

SLIDE BINDING 203
Emde Products, Inc. 4-page descriptive price folder of slide binding materials for 2 x 2, super slides, 2 3/4 x 2 3/4, 3¼ x 4 and stereo slides.

GENARCO SALE 204
Generaco Inc. 4-page audio-visual equipment catalog No. 286 and supplementary price list of used 3000-watt slide projectors for 3¼ x 4-in. slides.

GRAPHIC ARTS

PROJECTOR-PRINTER 220
Keuffel & Esser Co. 4-page folder describes the Kecofax projector-printer which employs an electrostatic system to make 34 x 48-in. prints in 40 sec.

PHOTOPOLYMER PLATES 221
E. I. Du Pont de Nemours & Co. 4-page folder describes the Dycril photopolymer printing plates and their applications.

PLATE MAKERS 222
NuArc Co., Inc. 4-page brochure describes the NuArc line of fliptop plate makers. Includes specifications and prices.

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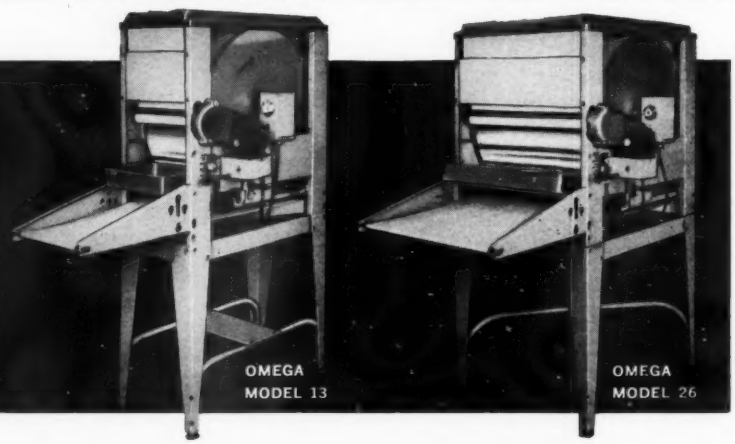

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REPRODUCTION MATERIALS
Grant Photo Products, Inc. 7-page catalog of reproduction materials includes papers, cloths, vellums and films. Send requests on letterhead.

DAVIDSON PAPER PLATES 224
Davidson Corp. Catalog sheet describes the steps required for use of Davidson Photorite presensitized paper plates for press runs up to 5000 copies.

KREONITE SINKS 226
Kreonite Inc. Catalog sheet for the Kreonite line of graphic arts processing sinks with and without temperature controls.

GEVACOPY PROCESS 227
Gevaert Co. of America, Inc. 4-page brochure describes the new Gevacopy Process for making aluminum plates for offset duplication in less than 2 min.

EQUIPMENT

AMGLO LIGHTS 213
Amglo Corp. Illustrated brochure and price list includes many stroboscopic tubes, flashtubes, signal lights, reflectors, ignition coils, transistorized power supplies and constant speed DC motors and timers.

LOGETRONICS BROCHURE 214
LogEtronics, Inc. 8-page brochure, *Contrast Control Brings Cost Control Through LogEtronics*, describes the two system—LogEtronics and LogEtration.

RETOUCHING MACHINE 215
Adams Retouching Machine Co. Brochure describes the features and operation of the Adams retouching machine.

SQUEEGE-IT 216
Tomorrow, Inc. 16-page catalog includes the wall mounted Squeege-it for wiping water from film. Also included are film hangers and Agi-Lung film agitator.

LIGHTING CATALOG
Mole-Richardson Co. 56-page catalog of specialized lighting equipment for motion picture, still and TV studios. Send request on company letterhead.

GYRO STABILIZER 217
Gordon Enterprises. Catalog sheet includes complete specifications of the Kenyon stabilizer which steadies hand-held cameras and binoculars.

DURST ENLARGER/COPIER 218
Durst, Inc. Illustrated brochure describes the Durst M35 unit for enlarging, copying and microphotographing on 35mm film.

FILM PROCESSING MACHINES 219
Ana-Tec Inc. 4-page brochure describes the Multi-Matic daylight operating Filmasters machines for processing 16, 35 and 70mm film or combinations of 16 and 35mm or 35 and 70mm.

STROBOSCOPIC LAMP 260
Chadwick Helmuth Co. Data sheet for Strobex stroboscopic lamp and power supply which is capable of 0-100 flashes per second. Includes prices.

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PHOTO BOOK CATALOG 239
Amphoto. 26-page catalog of photographic books includes subject and title cross-index.

MOTION PICTURES

UNDERWATER BLIMP 228
Birns & Sawyer Cine Equipment Co. Illustrated specification sheet describes the new 16/35 underwater blimp for 16 and 35mm Arriflex cameras.

PATHE 16MM CAMERA 229
Burke and James, Inc. Catalog sheet describes the Pathe 16mm Webo-M reflex cine camera. Includes description of accessories and prices.

35MM HIGH-SPEED EDITOR 230
Camera Equipment Co., Inc. Descriptive price sheet for the Ceco 35mm high-speed editor capable of speeds up to 270 fpm.

COST ESTIMATOR 231
Consolidated Film Industries. Slide-rule-type estimator for 16 and 35mm which automatically estimates running time, footage or cost of film from any one of these factors is offered by this New York and California firm.

MAGNASYNC 232
Magnasync Mfg. Co. Two price sheets include information on how to select a recorder to start a Magnasync-Magnaphonic sound system for motion picture recording applications.

SERVICES

DENVER COLOR LAB 233
Roundtree Color Lab. Two brochures offered by the Denver outfit include price schedules for complete color services for the still photographer.

WESTERN CINE SERVICE 234
Western Cine Service. 16-page producer's price list of complete 16mm cine services offered by this Denver lab. A price card of sound recording, editing and duplicating services on discs and ¼-in. tapes is also included.

ARIZONA COLOR LAB 235
Arizona Color Film Processing Laboratories, Inc. Price schedule for still and motion picture color processing services offered by this Phoneix firm. Includes duplicate transparencies, printing, etc.

CAMERA REPAIR SCHOOL 236
National Camera Repair School. 56-page booklet includes outlines of courses offered for home-study in camera repair.

COLOR LAB 237
Peterson Color Laboratory. Price card for Type C, Ektacolor and Dye Transfer prints in sizes up to 30 x 40 in.

PIC COLOR 238
PIC Color Corp. 8-page catalog for color processing and printing services offered by this New York outfit.

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EXAKTA-EXA
Owners of the two fine cameras will be pleased to learn that a new guide book has just been published covering all models, lenses, accessories. Full color cover, 128 pgs., charts, diagrams, and a special 16 page picture section make it a *best buy. By W. D. Emanuel and Norman Rothschild.*
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Box 298 Avondale, Pa.

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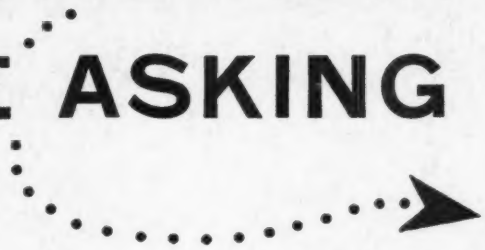

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NEW PRODUCTS

For additional information on any new product circle the appropriate number on the readers service card, page 77.

70MM VIEWER **101**
Moviola Manufacturing announces a 70mm viewer for motion picture film developed especially for the photo instrumentation field. The rear projection screen area is 12 x 14 in. Image size is 10 x 10 in. when projected from the standard 2¼ x 2¼ in. frame. The aperture is said to be large enough to permit viewing of timing and correlation marks on film edges. The unit handles up to 1000 ft. of film. A variable speed motor transports the film in forward or reverse.

MILLIKEN BORESIGHT **102**
A right-angle swivel boresight for use with Milliken's DBM 3, 4 and 5 16mm high-speed motion picture cameras has been announced. It swivels a full 360°. Magnification is from 10 to 25X. Low power for full frame viewing, high power for critical focusing.

ARRI UNDERWATER HOUSING **103**
The new Birns & Sawyer underwater housing for the Arriflex 16 and 35mm cameras is said to withstand underwater pressures at depths to 300 ft. without pressurization. Welded aluminum girder plate, stainless steel fittings, and O-ring sealers are used. The base of the housing accepts either size camera but the tops are different for 16 and 35mm. The 16mm housing will accept wide-angle lenses up to 5.7mm. The unit has a 400-ft. loading capacity.

KILFITT EXTENSION ADAPTERS **104**
Variable extension adapters for the 90, 150 and 300mm Kilfitt Kilar lenses have been announced by Kling Photo Corp. Use of the adapter with the 90mm f/2.8 Makro-Kilar extends the focusing range to 5¼ in; with 150mm f/3.5 Tele-Kilar, to 27½ in.; with the 300mm Tele-Kilar, to 6 ft. Price: $29.50. The price of 90mm f/2.8 Kilfitt Makro-Kilar lens has been reduced from $249.50 to $199.50.

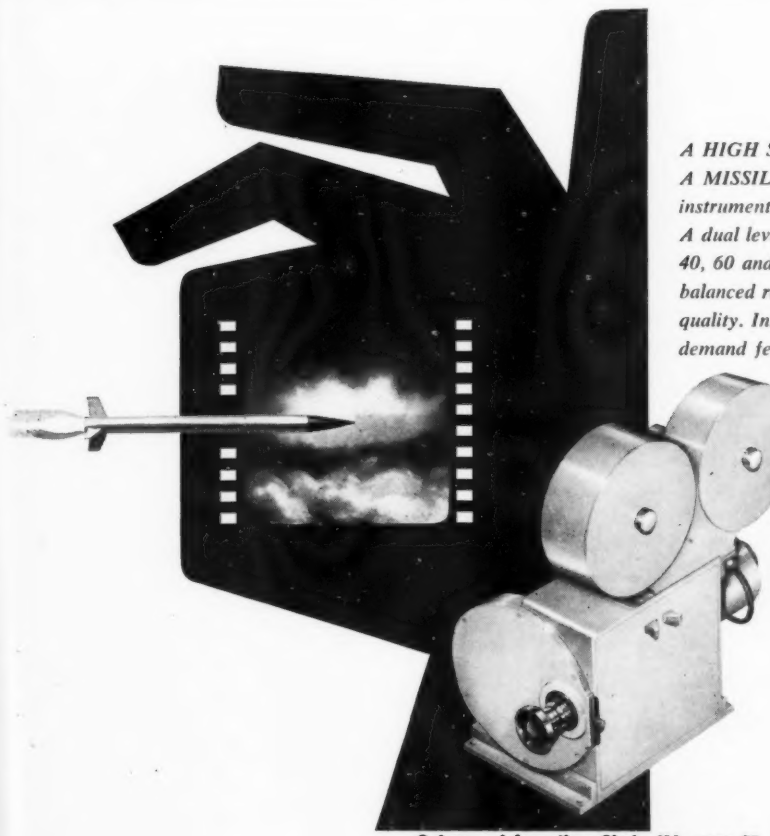
ANGLE DIAL READER **105**
Elevation-angle and azimuth-angle dials on cinetheodolite and radar data film may be viewed with the Parabam Inc. reader. By projecting the dials on a viewing screen and by utilizing a cross wire measuring system, the machine provides a rapid, accurate and efficient means for reading angle dials according to the manufacturer. An integral keyboard and selector switches are provided for entering additional data and the information is semi-automatically recorded on punched cards.

MECABLITZ FLASH UNITS **106**
Two new Mecablitz flash units have been announced by Burleigh Brooks. The new 102 is a two piece unit and 103 a one piece unit. Both guns weigh approximately 2 lbs., complete with 6-volt rechargable battery. Both use double transistors circuitry. The monitoring circuit is said to conserve battery energy. The trough type reflected covers 65°. Guide numbers for Ektachrome are 43-49. Recycling time is 8 sec. flash duration 1/1000 sec. Batteries give 75 flashes per charge. Price $59.95 with battery and charging unit.

ROYAL ZENITH PRESS **107**
Accommodating a 19 x 25½-in. sheet, the Royal Zenith 25 operates at speeds up to 8,500 iph. It accepts a paper range from 6 lb. tissue to 8 ply cardboard. It requires a floor space 55 x 86 in. This is said to be 50 per cent smaller than other popular makes. All operations are from floor level, requiring no platform.

CEC PROCESSING CHEMICALS **108**
Pre-mixed liquid chemical kits for use with CEC's Type 23-109A Oscillogram Processor are now being distributed by Electro Mechanical Instrument Division of Con-

(*continued on page 80*)



A HIGH SPEED 70 mm. RANGE CAMERA STOPS A MISSILE FOR ITS PORTRAIT—This new instrumentation camera has a 2¼ x 2¼ square format. A dual lever gear shift permits speeds of 10, 20, 30, 40, 60 and 80 frames per second with a dynamically balanced register pin movement for optimum picture quality. Interchangeable 1000 ft. magazines with special demand feed spool brake. A.S.A. type 1 perforations on film. Can you see any possible applications where you can use this precise camera for your photo instrumentation problems? We'll tailor this 70 mm. camera to your needs. Write to Photo Instruments Division of

benson-lehner *corporation*
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Get more information. Circle 410, page 77

solidated Electrodynamics Corp. The chemicals are packaged in plastic envelopes which are discarded after the chemicals are poured directly into the processor. The addition of warm water makes the solutions ready for use. No agitation is required. Each kit contains four envelopes of liquids, each for a separate developing or stabilizing tank.

KENSOL HOT PRESS **109**

Camera Equipment Co. Inc. recently introduced a hot press designed to produce quality opaque titles on posterboard, paper, cellulose, acetate, photographs, cloth, etc. The Kensol Press letters several lines in one operation and can produce third dimensional and drop shadow effects as well as normal lettering. The stamping foil comes in a variety of 17 colors and comes in 200-ft. rolls. Prices start at $450.

VOUGHT PRODUCTS **110**

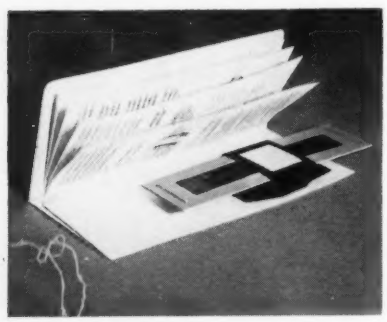
A new 16mm rotating prism photographic recorder which operates at speeds up to 1000 frames per second is the Vought VRP-16. The camera has a 100-ft. magazine as standard but 200 and 400-ft. magazines are available. Price $1279.

The New VFA-25 Flight Analyzer is said to eliminate the need for ground technicians in the testing and certification of aircraft in the determination of takeoff and landing data. Information is now obtainable by double triangulation from use of the Vought analyzer. Features include double mechanically interlocked film movements utilizing 16mm film; 100 or 200-ft. film capacities, and speeds up to 200 fps.

Also announced recently was a small, compact and light weight 16mm electrically operated photographic recorder designed especially for use on pilots' protective helmets. It accommodates any ASA "C" type lens. Capacity is 30 ft. Speed is 24 fps at 24 volts DC. Weight is less than 19 oz.

SELL-O-VUE **111**

Sell-O-Vue is a sales presentation package combining a color film-strip mounted in its own heavy-duty mount and a patented



folding viewer. The whole unit, manufactured by the Taylor-Merchant Corp. and folds flat and fits into an envelope suitable for mailing. Dimensions are 8 3/4 x 3 7/8 in.

PROTECT-A-PRINT **112**

Protect-a-Print is a heavy-base film coated on one side with a cleaning and polishing compound announced by Flight Research Inc. When run through a camera, projector, data-reader or printer, it removes foreign matter from the film path it is said. 500 ft. of 16mm single or double perforated costs $60. 35mm double perforated is $90. 250 ft. of 70mm perforated or non-perforated is $90.

WADDELL HIGH-SPEED CAMERA **117**

A camera with a speed range of from 3 to 10,000 pps depending on the camera model and motor combination has been announced by Camera Equipment Co., Inc. This firm was appointed exclusive distributor for this new Waddell high-speed motion pic-

ture camera, designed by John H. Waddell. The camera accepts a 400-ft. magazine and is driven by either a permanent magnet 26V DC or 115V AC-DC motor. A complete line of accessories are available including a set of lenses from 3.2mm to 152mm.

MAGNIFAX DOOR **113**

An improved door has been designed to eliminate problems of light leakage and insecure attachment reported with the old door for the Magnifax high-speed motion picture cameras. Made of a rigid aluminum casting fitting flush against the edge of the camera housing and carrying on its inside surface a recessed plate which forms a right-angle light trap, the unit is attached to the camera by means of a threaded stud and single centered knurled knob. All presently manufactured Magnifax cameras have the new door as standard equipment.

INTERFERENCE FILTER **119**

A colorless, non-absorbing FS Multi-Layer interference filter which removes ultra-violet and reflects the infra-red has been announced by the Fish-Shurman Corp. This filter transmits about 90 per cent in the visible from 425 mu. to 700 mu. and has a sharp cut-off beginning at 700 mu., reflecting the longer wave lengths. The use of this filter is said to result in sharpening up and improving the grey scale, permitting a wider density range as is needed in color photography, printing or enlarging.

VU-GRAPH KIT **116**

A selection of tools and materials for producing illustrations for use with the Vu-Graph overhead projectors has been introduced by Beseler. Messages can be traced, drawn, lettered or typed and can be prepared in advance or on-the-spot, in front of an audience. Colored sheets are available as well as black-and-white illustrations on acetate sheets. The complete kit with case for 10 x 10 in. transparencies retails at $45; for 7 x 7 in., $35.

ZOOM BENCH **118**

A zoom bench capable of reducing or enlarging a frame 20 diameters while main-taining automatic self focus and aperture has been introduced by Easters Effects, Inc. The unit is also said to provide even distribution of the light source in the field. The bench permits spinning a scene 360° and at the same time running live footage without use of prisms.

MICROMINIATURE INCANDESCENT **120**

A lamp small enough to pass through the eye of a darning needle has been announced by Sylvania Electric Products Inc. Called the Mite-T-Lite its dimensions are: .040 in. diameter; .125 in. nominal body length; filament is .00025 in. tungsten wire of approximately 30 turns. Its light output is in the order of 100 mililumens at 1.5 volts input. The efficiency of the lamp is approximately 1.5 lumens per watt.

ROBERTSON CAMERA **121**

An office-type copy camera, especially designed for use with the new Eastman Kodak Ektalith process has been announced by Robertson Photo-Mechanix, Inc. The Econo-mite camera comes complete with a handy shelf to accommodate the Ektalith Leader/Processor and an adjustable adapter for the Ektalith plate holder. Direct reading scales, a positive screw drive move-

ment and a Goerz lens are said to provide a full range of three times enlargement through three times reduction. The 18 x 23-in. copyboard is illuminated by two banks of incandescent lights that are enclosed to prevent light from spilling out into the office. Exposures are controlled by an automatic 3-min. re-set timer and Robertson's own exposure computer guide.

65MM FOR SUPER GRAPHIC **127**

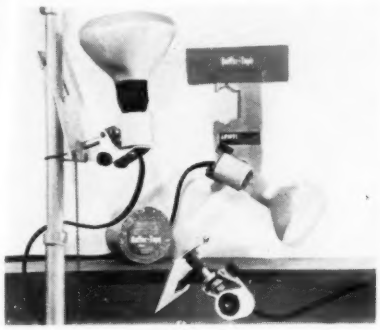
The 65mm Super Angulon f/8 lens is now available for the Super Graphic camera in a special Graflex focusing mount. The Schneider lens, is mounted in a Compur MVX shutter with speeds from 1/500 sec. to 1 sec. plus B. The total angle of view of 100° is said to be obtainable even at full aperture. Price: $183.90.

NEGAFILES **128**

Two new files for strips of 35mm film have been added recently to the Nega-File line of hardwood files. Nega-File 35-G-4-300 is equipped with 300 glassine thumb cut envelopes with lip, three indexes and visible numerical guides printed from 10-300. Price: $9.55. 35-4-300, comes with 300 acetate sleeves, with provision for the printed strip for identification of each exposure. Price: $15.95.

LOWEL LIGHT 131

A new lighting unit for motion picture and still photography was recently introduced by Lowel Light Photo Engineering. The unit employs a new wall mounting system which incorporates a special Gaffer tape which is said to hold lights in place for several days without marring painted surfaces. The lights may also be mounted



on stands, pipes, furniture, shelves, doors, etc. A universal swivel permits directional control. A heat insulated finger grip prevents burning fingers. Price of the Lowel Light kit which includes 5 units, gaffer tape and a carrying case is $29.95. Single units, $6.95. Gaffer tape, $1.95 for 15 yard roll.

BLU-RAY PROOF-PRINTER 129

A 14-in. machine which is capable of making 200 to 300 P.O.P. proofs per hour and a 42-in. machine which can turn out 400 to 500 studio proofs per hour have been announced by Reproduction Engineering Corp.

Either model operates on any 110V line. It has proved effective when proofing automatic 70 and 90 millimeter camera-film, it is said. The 14-in. machine is $197.50; 42-in. is $287.50.

MULTILITH ATTACHMENT 115

A new accessory unit to automate the 1250 Multilith has been announced by Ostwald Industries, Inc. Called the Program-Matic M2 Control System, it provides selective, one-knob operation from the single plate cylinder handle. A built-in counter can be pre-set for any desired number of copies, and on completion of the run will automatically stop the feed. The circuit of the unit is said to permit stopping the press at any time to clean a master or clear a feed jam without losing count. This unit is also said to cut the duplicating steps from thirteen to as few as three. Prices available upon request.

DIGITAL CLOCK 122

A digital clock designed for use in process control systems has been announced by Paraban, Inc. The unit utilizes sealed components which permit use of the clock where explosive gases are present, it is said. Besides featuring oil filled step switches, mercury wetted relays and sealed switches the clock has a visual display. The display, composed of single plane in-line lamp banks, may be remotely mounted in order to conserve front panel space. Optional features include switching circuitry that transfers power input to the clock to a DC source when AC power failure occurs.

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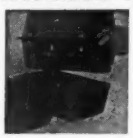

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PROTEIN MOLECULE

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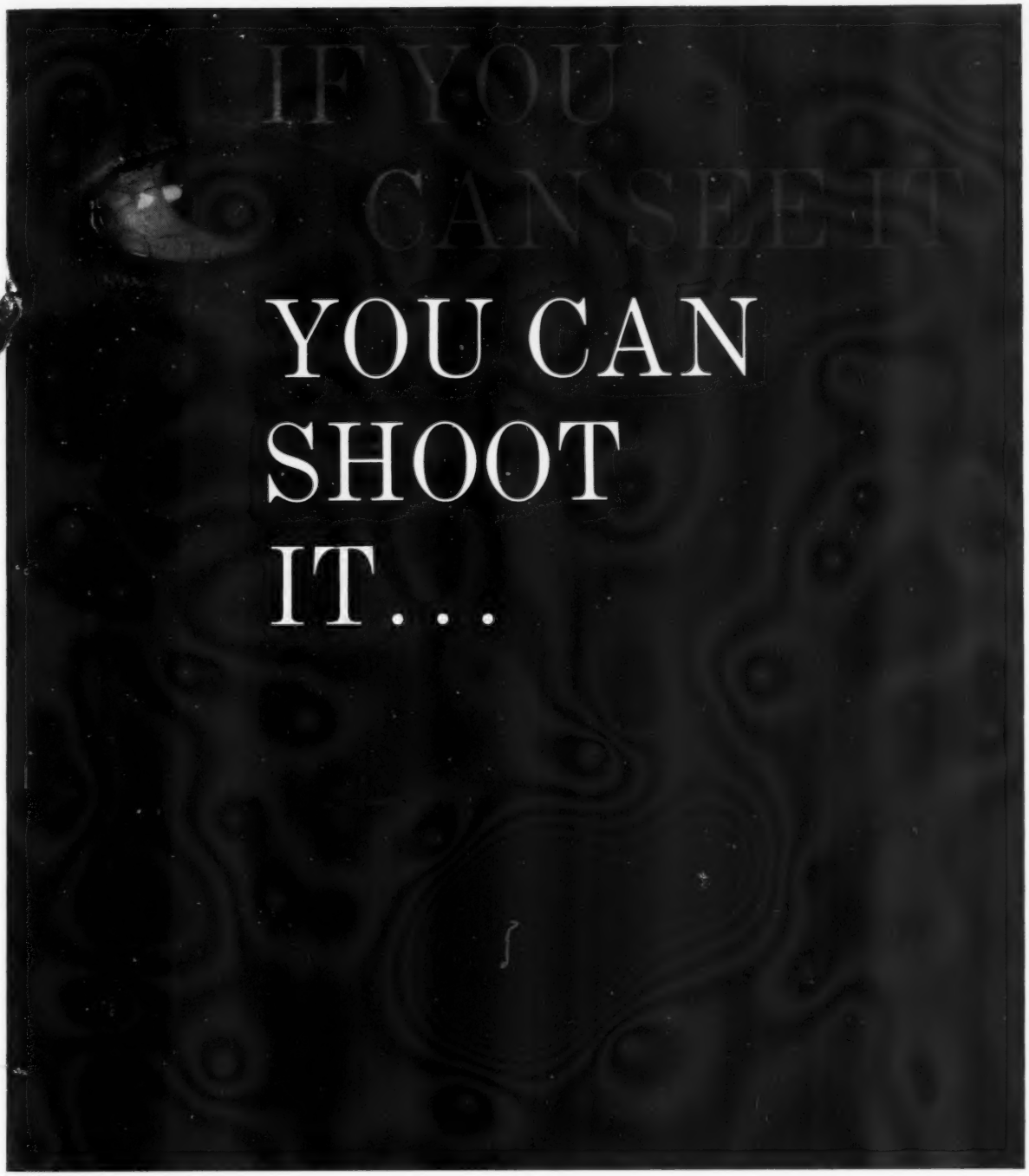

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*This film was introduced as **Kodak Color Reversal Film, SO260 or SO270.** Now we have a name: Kodak Ektachrome ER Film.

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